

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

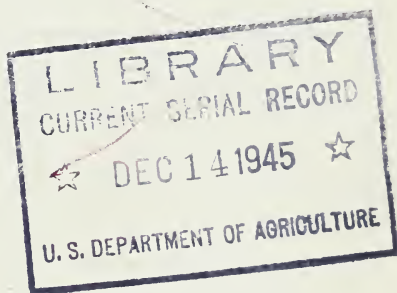
411

A

Domestic Cotton Surplus Disposal Programs

By Edgar H. Omohundro and Nathan B. Salant,
Production and Marketing Administration

and Maurice R. Cooper, and L. D. Howell,
Bureau of Agricultural Economics



UNITED STATES DEPARTMENT OF AGRICULTURE
Washington, D. C.

September 1945

Miscellaneous Publication No. 577

This report was prepared for the Interdepartmental Technical Committee on Cotton and first issued in a limited mimeographed edition as Cotton Document No. 11, May 1945.

CONTENTS

	<i>Page</i>
Summary and conclusions	1
Introduction	4
Action programs to increase consumption	5
Programs for relief and low-income families	5
Red Cross cotton	5
Federal Emergency Relief Administration distribution program	9
Cotton stamp plan	12
Cotton mattresses and comforters	16
Cotton blankets and sheeting	20
Diversions for new-uses programs	21
Cotton insulation	22
Cotton bagging for cotton bales	26
Cotton for paper	29
Cotton for binder twine	31
Cotton mats for curing concrete	33
Cotton reinforcing membrane for bituminous-surfaced roads	35
Miscellaneous cotton diversion programs	37
Comparison of the various action programs	42
Relative expenditures for each program	42
Effect on value of cotton crop	44
Effects on consumption	45
Incidence of costs	45
Distribution of benefits	47
Other Government activities relating to cotton surplus disposal	49
Government research relating to new and extended uses of cotton	49
Surveys and reports on existing uses of cotton and its products	50
Other Government efforts to stimulate increased consumption of cotton	51

2
C.
S1
/4

Domestic Cotton Surplus Disposal Programs

SUMMARY AND CONCLUSIONS

In the predepression years of 1924-29 the net farm income per person on farms in the 10 principal cotton-producing States was only about 14 percent as large as the per capita net income of all persons not on farms in the United States. This low per capita income, the importance of cotton to farmers in the Southern States, and the large surplus stocks of cotton were among the reasons why the Government made efforts to improve the conditions among the farmers in that region, and they were among the reasons why efforts were frequently directed toward improving the cotton situation as well.

Among the Government's efforts designed to alleviate distress, to increase cotton consumption, and to reduce the cotton surplus, there have been a number of individual or groups-of-action programs. Twelve are reviewed in this report. These include five programs pertaining to the distribution of raw cotton and cotton products to low-income groups, primarily as relief measures. Two of these programs, which represented about 42 percent of the total expenditures and 45 percent of the expenditures for the programs designed primarily as relief measures, were carried on by agencies other than the Department of Agriculture. With the possible exception of the Binder Twine Program, the other seven were designed to stimulate new uses for cotton which might eventually become so well established as to require no Government payments.

These programs, from the beginning in 1932, through 1944, in the aggregate cost the Federal Government, excluding administrative expenses, approximately \$137,800,000. It is estimated that they utilized a total of about 1,384,000 bales of raw cotton at an average cost of about \$100 per bale. The Mattress and Comforter Program accounted for more than half of the total cotton utilized, but only one-third of the total cost. This program, together with the Federal Emergency Relief Administration and the American Red Cross Programs, accounted for well over 1 million bales of cotton or about 82 percent of the total. Despite the relatively low cost of the Mattress and Comforter Program per bale of cotton involved, the three programs combined accounted for almost as large a percentage (73 percent) of the total costs as of the total cotton utilized.

The average cost per bale of cotton utilized in the various programs ranged from a low of a little under \$19 in the Cotton for

Paper Program (see footnote 2, table 1), to an estimated \$546 in the case of the Cotton Stamp Plan. Other programs in which the costs were relatively low included the Cotton Bagging for Cotton Bales (\$30 per bale of cotton utilized), Cotton Insulation (\$38 per bale), and Cotton Mattress and Comforter (\$58 per bale). The programs in which the costs per bale of cotton utilized were relatively high, although much lower than in the Cotton Stamp Plan, included the Red Cross (\$202 per bale), Federal Emergency Relief Administration (\$112½ per bale), Cotton for Binder Twine (\$105 per bale), and Blankets and Sheeting (\$126 per bale). The years in which the programs were in operation had a considerable effect on the relative costs, for there were changes in the prices of cotton and cotton textiles. The quality of cotton utilized also had decided effects on relative costs. In general, however, the most important factors accounting for the differences in cost per bale of cotton utilized are (1) the extent to which the raw cotton is processed and (2) whether the Government has borne all or only a part of the cost of getting the cotton used. (See table 1 for these and other data regarding these programs.)

The programs involving the smallest Federal expenditures per bale of cotton utilized tend to cause the greatest increase in con-

TABLE 1.—Summary of 12 Domestic Cotton Surplus Disposal Programs

Name of program	Years operated	Cotton utilized	Total cost	Cost per bale of cotton	Influence on value of current American cotton crop per dollar spent ¹
		<i>Bales of 478 lbs. net</i>	<i>1,000 dollars</i>	<i>Dollars</i>	<i>Dollars</i>
Programs for low-income groups:					
1—Red Cross Cotton.....	1932-33	151,951	30,690	201.97	0.10
2—FERA Program.....	1934-35	244,925	27,570	112.57	.19
3—Cotton Stamp Plan.....	1939-42	43,143	23,567	546.25	.08
4—Mattresses and Comforters	1935-36 and 1938-42	734,057	42,686	58.15	.52
5—Blankets and Sheeting..	1939-40	30,192	3,804	126.00	.20
New-uses programs involving payments of partial costs:					
6—Cotton Insulation	1940-45	44,837	1,698	37.87	1.42
7—Cotton Bagging for Cotton	1938-44	76,770	2,303	29.99	1.48
8—Cotton for Paper.....	1939-41	² 6,181	² 116	² 18.76	² . . .
9—Cotton for Binder Twine.	1942-43	40,526	4,248	104.82	.53
New-uses programs involving payments of all costs:					
10—Cotton Mats for Roads..	1936	4,135	365	88.38	.53
11—Cotton Reinforcing for Roads	1936	4,059	363	89.48	.53
12—Miscellaneous Diversion.	1937-39	3,540	385	108.73	.27
Total or average.....	1,384,316	137,795	99.54	.30

¹ The estimated influence of these programs toward increasing the value of the then current American cotton crop is based on estimated average supply-price relationship in recent years as shown in the U. S. Department of Agriculture Tech. Bul. 755, Cotton-Price Relationships and Outlets for American Cotton. These influences stand for the changes that normally would be expected if all the cotton and cotton products used in these programs represented net increases in demand for cotton and if the influences of these increases were not nullified by price-support loans or other developments.

² These data include cotton linters, card strips, and cotton comber nolls as well as lint cotton. The average cost per pound was somewhat larger for lint cotton than for the other materials, but for the last year in which the program was operated the payments were the same for each type of material and were equivalent to only \$16.14 per bale.

sumption and the greatest decrease in the cotton surplus, per dollar of Government expenditures. This fact, in turn, tends to result in the greatest increase in cotton prices and thus tends to provide the greatest benefit to cotton producers. The quantities of cotton consumed under most of these programs themselves, as such, however, were too small to have had any noticeable effect on prices for cotton. If all the cotton and cotton goods used in these programs had represented net increases in the demand for cotton, such increases would have tended to increase the total value of the then current American crop by about 30 cents, on the average, for each dollar spent by the Government on all these programs combined—ranging from about 8 cents for the Cotton Stamp Program to about \$1.48 for the Cotton Bagging for Cotton Bales Program (table 1). Such influences of programs for increasing cotton consumption would be the same regardless of whether the programs were operated by the Government or by private industry.

But all the cotton and cotton products disposed of in these ways may not have represented net increases in demand. Furthermore, price-strengthening loans or other similar influences not usually associated with supply-demand-price relationships tend to increase the cost of operation and to limit the immediate effect of the programs on prices.

The programs covered by this publication, however, were designed primarily to alleviate distress, to increase cotton consumption, and to reduce the surplus, rather than to have an immediate lifting effect on cotton prices.

The action programs designed to reduce the cotton surplus are based upon numerous research activities, mostly conducted by the Government. These activities include economic, biological, chemical, physical, and other types of research designed to develop new and extended uses for cotton. Other activities of the Government designed to reduce the cotton surpluses by increasing cotton consumption include surveys and reports on the quantity of cotton used in the production of different types of cotton products and technical assistance and advice given commercial concerns that are interested in developing new outlets for cotton and maintaining and extending existing markets.

Experience gained in the operation of these programs indicates that distribution activities designed primarily as relief measures may be effectively instituted, if compatible with governmental policy, when cotton stocks are burdensome and when general economic conditions are at a low ebb. Under such conditions distribution programs would tend to improve the situation of cotton growers while benefiting recipients among low-income families. They may also prove effective during periods of relatively high average national income if cotton stocks are in large surplus and if a segment of the population is existing under depressed living conditions in relation to a minimum desirable standard of living.

New-uses programs for cotton appear to offer continuing benefits to cotton growers by creating new and possibly continuing outlets. Any success in this direction is advantageous to cotton producers. If existing demand for cotton in other fields is maintained, the development of new uses constitutes a net increase to the established level of demand. If existing demand for cotton

is reduced because of shifts to competitive fibers, or changes in consumer preference, or other reasons, the development of new uses would tend to offset or at least to cushion the effects of such reductions.

In appraising the relative merits of the new-uses programs in particular, the possible or probable long-run effects are much more important than the cost per bale or the quantity of cotton utilized while the programs are in operation. In formulating these programs, it was anticipated that they would not only result in a net increase in cotton consumption while in operation, but, by demonstrating cotton's desirable qualities for these uses, would result in cotton being continued in use, possibly in greatly increased volume, on a self-sustaining basis for such purposes after the payment programs were discontinued. In some instances, the continued employment of cotton has already taken place. In the case of insulation, for which a program is still in effect, developments to the present time indicate similar final results. The possibilities are that much larger quantities of cotton may be utilized this way than for most other new purposes.

INTRODUCTION

Chiefly because of the low level of income and the substandard living conditions among such a large percentage of the farmers of the South, the United States Government over a period of years has employed a number of methods in an attempt to improve the economic and social conditions in this segment of the Nation's population. The fact that a large proportion of the 2,367,000 farm families of the 10 principal cotton-producing States¹ need assistance is clearly indicated by the available data on farm income.

For example, in the predepression years of 1924-29, the annual gross farm income (total cash receipts plus value of farm products used in the home) per person on farms in these 10 States was \$247 as compared with an average of \$438 per person on all farms in the United States. After deducting production expenses, annual *net* farm income per person on all farms in the United States was estimated to have averaged \$212, or only about half as much as the *gross* farm income. If the net per capita farm income in the 10 principal cotton-producing States was proportionately less than gross farm income, the net income from farming in these States would have averaged only \$119. This, in turn, would have been only 56 percent as large as the average net farm income per person on farms in all States and the equivalent of only 14 percent of the per capita net income of all persons not on farms in the United States.

In 1943, the per capita gross farm income, including Government payments, in these 10 Southern States was about 80 percent above the 1924-29 average, but this increase was much less than that of farm income in the other 38 States and very much less than the increase in per capita nonfarm income. Consequently, the 1943 and 1944 per capita farm income in the 10 principal cotton-producing States was extremely low relative to that of

¹ North Carolina, South Carolina, Georgia, Texas, Oklahoma, Mississippi, Arkansas, Louisiana, Tennessee, and Alabama.

other parts of the country and especially so in relation to the income of nonfarm groups.

In view of the importance of cotton to most farmers in the South, a substantial part of the Government's efforts to improve the conditions among the farmers in this region has been directed toward improving the cotton situation. Among these activities are a wide variety of programs designed to reduce the cotton surplus which, along with the depressed demand conditions in the early 1930's, resulted in extremely low prices for cotton and farm income from cotton. With greatly restricted domestic cotton production and improved general economic conditions, the surplus stocks of cotton were later reduced, but prices of and farm income from cotton continued to be highly unsatisfactory. Furthermore, in the late 1930's, a record United States crop and reduced exports increased the domestic and world stocks of American cotton to the highest levels in history.

Government programs formulated to help reduce the cotton surplus included the financing of the distribution of cotton for relief and for low-income families, the making of payments for diverting cotton into new uses, Government surveys of the utilization of cotton, and Government financing of research designed to develop new and extended uses of this fiber. It is the purpose of this publication to give a brief review and analysis of several of these programs, in order to bring about a better understanding of them and to indicate something of their relative costs and benefits.

ACTION PROGRAMS TO INCREASE CONSUMPTION

PROGRAMS FOR RELIEF AND LOW-INCOME FAMILIES

RED CROSS COTTON²

Background of program.—By the winter of 1931-32, the third after the stockmarket crash of late 1929, the need for increased Federal relief for the unemployed and partially employed became acute. During the two preceding winters, relief stemmed mainly from the resources of relatives, neighbors, private organizations, and a few local public agencies. In areas throughout most of the Nation, many families were in urgent need of food and clothing. School teachers reported many children out of school because of lack of clothing and many adults could not take jobs or engage in work relief for the same reason.

At the time that many families were in great need of food and clothing, the Federal Government, through the Grain and Cotton Stabilization Corporations of the Federal Farm Board, had possession of large quantities of surplus wheat and cotton. In the latter part of 1931, a resolution was introduced in the United States Senate and reported favorably by the Senate Committee on Agriculture providing for the transfer of some of the Government's stock of surplus wheat to the American Red Cross for distribution to the needy and for feeding livestock in the drought area. On March 7, 1932, an act authorizing such action was approved by the President of the United States.

² Based largely on an official report by the American National Red Cross: *THE DISTRIBUTION OF GOVERNMENT-OWNED WHEAT AND COTTON*. 115 pp., illus. 1934.

The experience in the first few months of the wheat distribution program was followed by Federal legislation providing for the transfer of cotton. An act, signed by the President on July 5, 1932,³ provided for the transfer of 500,000 bales of the cotton held by the Cotton Stabilization Corporation of the Federal Farm Board to the American Red Cross to be manufactured "... into or exchanged for cloth, or wearing apparel, or other articles of clothing made of cotton." On February 8, 1933,⁴ additional legislation was approved by the President making "... the remainder (not in excess of 350,000 bales) of the cotton of the Cotton Stabilization Corporation, for use in providing cloth, wearing apparel, and bedding, comforters and blankets for the needy and distressed people of the United States and territories."

Description of Program.—With the experience gained in administering the distribution of wheat as a basis for a plan, the American Red Cross had taken certain preliminary steps even before the President had signed the act authorizing the distribution of cotton. Consequently, on the day the act became a law, a Central Cotton Distribution Office was opened at the national headquarters in Washington, and steps were taken immediately to determine the kind of cloth and garments most urgently needed and to draw up specifications for them. The specifications were prepared with the assistance of the National Bureau of Standards, other Government bureaus, and some of the trade associations. In selecting the cloth and garments and in establishing the specifications, stress was placed on durability, warmth, cost, and style.

On August 12, 1932, the Red Cross chapters were sent applications for ordering cloth to be made into garments in chapter workrooms. On August 19 the first purchase of cloth was made. On the following day, the first shipment of cloth was started and the first emergency purchases and shipments of ready-made garments for school children occurred. On October 12, chapters were furnished forms for making applications for the first general distribution of ready-made garments. Two months later, applications for sweaters were forwarded to the Red Cross chapters. followed in mid-February 1933 by applications for blankets, comforters, and sheeting. On June 2, 1933, the final distribution of clothing began. Chapters were given an opportunity to order hosiery, underwear, outer garments, and men's shirts, and to indicate preferences between sweaters, cloth, and blankets in such quantities as the remainder of the cotton would permit. By October 1, 1933, the distribution of practically all cloth and other items except blankets and comforters had been made. By December 1, the latter were nearly all distributed and by the end of 1933, practically all operations had been completed.

Under the contracts drawn up by the Red Cross, the cotton required as payment for cloth and other items was determined by the market value on the day the contract for these items was placed, although, for a part of the time, the premiums above and

³ United States Congress, Public Resolution No. 33. (72d Cong.) H. J. Res. 418, authorizing the distribution of Government owned wheat and cotton ... 1932.

⁴ United States Congress. Public, No. 329. (72d Cong.) H. R. 13607, an act, to authorize the distribution of Government-owned cotton to the American National Red Cross ... 1933. On March 3, 1933, an act was approved authorizing the American National Red Cross to exchange Government-owned cotton for articles containing wool, but as a large part of the cotton had already been drawn upon for clothing and bedding, it was not necessary for the Red Cross to take advantage of this authority.

below the market price (for the particular grades and staples of cotton delivered) on the date the cotton was transferred were used in determining the value of the cotton. The contracts provided that the cloth and other items were to be shipped by the manufacturer to such destinations as the Red Cross indicated and that the manufacturer could be required to hold the goods, in whole or in part, at the manufacturer's risk and expense up to 90 days from the date of the purchase order. The prices paid for the cloth and clothing were equivalent to their "... cost or ... the market quotation, whichever was lower." The ownership of the manufactured articles remained with the vendors until the articles reached their destination.

The Red Cross did not make final settlement for the goods and the transportation charges until it had received complete evidence of delivery at the point of final destination. This made the shippers responsible for damage claims or for goods lost in transit. A careful system of inspection was set up by the Central Cotton Distribution Office to insure the delivery of the goods called for in the contracts.

In the fall of 1932, there were insufficient orders to keep cotton mills and factories going full time and most producers were glad to obtain the business resulting from this program in order to keep their workers employed, even though the law specified that these goods should be produced without profit to the manufacturers. In the beginning, when immediate distribution was urgent, practically all available production was bought, but later a serious attempt was made so to distribute contracts for cotton goods as best to relieve unemployment. Thousands of workers were kept employed who otherwise would have become subjects for relief.

On August 26, 1932, a Cotton Settlement Office was set up in New Orleans to take over the cotton from the Stabilization Corporation, to dispose of it in payment for cotton products, and to handle other matters relating to the raw cotton. The practice at first was to transfer the cotton to vendors of cotton products or their agents. In many instances, however, the vendors could not use raw cotton as they were not processors of raw cotton. Consequently, an alternate method of transferring the cotton to the vendor was developed. If he so wished, the vendor could appoint the Red Cross to act as his agent in disposing of the cotton for his account. On February 8, 1933, legislation became effective which authorized the outright disposal of the cotton with the "... proceeds used for acquiring cloth, wearing apparel or other articles of clothing or bedding made of cotton." By the middle of June 1933, all of the raw cotton had been disposed of and on June 24, the Cotton Settlement Office was closed.

The problem of actually distributing the cloth and other items fell chiefly upon the local Red Cross chapters. In the administration of this task, committees were appointed to plan and supervise such matters as the selection of styles and patterns, the cutting and assembling, and the sewing. Many individuals who were eligible for clothing relief received the cloth, thread, buttons, etc., and made their own garments. Many other items were made by women who were on relief rolls. In addition, some 700,000 volunteers helped to sew the garments made from the more than 100 million yards of cloth used for this purpose.

Quantity and Cost of the Cotton and Cotton Textiles Distributed.—Under the actual operation of this program, 844,063 bales of cotton were made available to the Red Cross. It has been estimated that this cotton had a total value of \$30,690,000 based on the prices at which the cotton was sold or exchanged for cloth, garments, and other items. The average value per bale was roughly equivalent to \$36.36. Assuming the average weight of the running bale to have been 500 pounds, gross weight, this would be equivalent to 7.27 cents per pound. Actually, the bale probably ran somewhat in excess of 500 pounds, so that the average value per pound was somewhat less than indicated. In exchange for this raw cotton or for the funds obtained from its sales, the American Red Cross bought and distributed almost 103.6 million yards of cloth (mostly cotton flannel, shirting, print cloth, muslin, and gingham), 13.5 million outer garments including shirts, 19.7 million undergarments, 27.3 million pairs of hosiery, 3.2 million blankets and comforters, and 6.3 million sweaters.

In a few of the months during which the program was in operation, the distribution of cotton ranged between 5 million and 20 million yards per month. The distribution of garments was somewhat more evenly divided, while in the case of blankets and comforters, roughly half of the total distribution occurred during March 1933.

Practically all of the disposal of raw cotton by the Red Cross under this program occurred from December 1932 to June 15, 1933. Much of it took place after February 8, when a law was approved authorizing the outright sale of this cotton. In most of the weeks from late March to June 15, weekly sales or disposition of raw cotton were above 35,000 bales, and for the weeks ended April 22 and June 10 were some 60-odd thousand and a little over 90 thousand bales, respectively.

Through the Red Cross chapters and other local agencies, approximately 5.9 million families received clothing relief. Clothing was distributed in all but 18 of the 3,098 counties in the United States and in Alaska, Hawaii, and Puerto Rico. Altogether, 66.7 million ready-made garments and approximately 38 million chapter-produced garments, 3.2 million blankets and comforters, and 1.1 million yards of sheeting were distributed. The raw cotton required to produce these items has been estimated at roughly 152,000 bales. The total cost of these items, including transportation of cotton products, was \$30,690,000 or equal to the total equivalent value received for the disposition of the cotton turned over to the Red Cross. The computed average cost per bale of cotton required in these items was, therefore, \$201.98 per bale (table 2).

Outlook for This Method of Disposing of Surplus Cotton.—This program was designed primarily as an aid to those in need of Government relief due to the widespread unemployment and low level of farm income. The extent to which it might contribute to a reduction in the cotton surplus appears to have been given relatively little consideration. With the completion of the program and the closing of the Central Cotton Distribution Office at Washington on February 28, 1934, the primary objective had been achieved. By that time various governmental measures had been taken to provide other types of assistance to those most in need.

Even in periods of reasonably good business conditions, large numbers of individuals are in need of assistance either from the Government or from other agencies or organizations. But only in the event of an emergency situation, such as existed in 1930-33, is it probable that this type of program might be used again. To the extent that many of the items distributed under such a program are made by volunteer workers and by workers on relief rolls, a given expenditure of Government funds by means of this type of program provides maximum direct relief to those most in need. From the standpoint of disposing of surplus cotton, this type of program requires a greater Federal expenditure per bale of cotton utilized than would several other types which have been in operation.

TABLE 2.—*Number, cotton content, and cost of items obtained in exchange for Government-owned cotton distributed by the American Red Cross*

Item	Number of items purchased	Estimated raw cotton equivalent	Delivered cost excluding administrative expenses	
			Total	Per bale
	1,000	Bales of 478 lbs. net	1,000 dollars	Dollars
Blankets and comforters.....	3,180	24,091	3,358	139.37
Garments:				
Outer garments (inc. shirts)...	13,514	60,097	19,639	326.79
Undergarments	19,660			
Hosiery (pairs)	27,268			
Sweaters	6,290			
Cloth (yards):				
Muslin	13,674	67,763	7,693	113.54
Birdseye	5,794			
Prints	21,401			
Shirting	19,270			
Flannel (light-colored)	21,978			
Flannel (dark-colored)	1,710			
Gingham	13,132			
Dress material	5,441			
Suiting	106			
Duck	8			
Sheeting	1,136			
Total or average.....		151,951	30,690	201.98

FEDERAL EMERGENCY RELIEF ADMINISTRATION DISTRIBUTION PROGRAM

Background of Program.—Red Cross relief activities of 1932 and 1933 alleviated some of the depression distress by distributing fabric and articles of clothing. The extent of depressed living conditions was so great, however, that the situation as a whole remained extremely critical in the succeeding year. Many people continued to be without work and were receiving extremely meager supplies of food and clothing, while at the same time large surpluses and low prices continued in regard to cotton and many other agricultural products. Thus the welfare of farmers remained at a low ebb. This resulted ultimately in the formulation of Federal emergency relief distribution programs.

Description of Program.—On May 12, 1933, the President of the United States approved the Federal Emergency Relief Act of 1933 (Public, No. 15, 73d Congress) "To provide for cooperation by the Federal Government with the several States and Territories

and the District of Columbia in relieving the hardship and suffering caused by unemployment, and for other purposes."

The act directed the Reconstruction Finance Corporation (RFC) to make available for expenditure under the act not to exceed \$500,000,000 and created the Federal Emergency Relief Administration (FERA). The Administrator of FERA was authorized to make grants to the States, and provision was made for payment of such grants in the form of money, services, materials, and/or commodities to provide the necessities of life to persons in need. Each State applying for grants was entitled to receive for any one quarter an amount equal to one-third of the amount expended by the State for relief purposes during the preceding quarter. Provision was also made for additional unmatched grants if found necessary. Later appropriations were granted by Congress to repay the RFC loan and to permit FERA to continue the program on an independent basis.

Under the act, each State made application for funds through its State administrator, who was the Governor of the State. State Emergency Relief Administrations (SERA) were established to handle relief activities within each State.

It was ruled that Federal funds might be used to pay for the following types of relief: (1) Food, determined by the numbers, ages, and needs of the individual members of the family in general accordance with standard food schedules; (2) provision of shelter or its equivalent; (3) light, gas, fuel, and water for current needs; (4) necessary household supplies; (5) clothing; (6) medicine, medical supplies, and/or medical attention to be furnished in the home. Grants were also authorized "... to aid in assisting co-operative and self-help associations for the barter of goods and services," to help Indians, to establish an emergency education program, and to provide drought relief.

On September 22, 1933, the President announced the availability of surplus commodities, which the Agricultural Adjustment Administration would buy and FERA would distribute to the unemployed in the various States. The first allocation covered 100 million pounds of cured pork; it was indicated that other products such as beef, dairy and poultry products, and cotton would probably be available later. It was emphasized that allocations of surplus commodities would be in addition to amounts received by unemployed, where these were inadequate, for the purpose of providing reasonable standards of sustenance.

Distribution of surplus commodities was materially accelerated beginning in October 1933 with the establishment of the Federal Surplus Relief Corporation (FSRC). The FSRC was incorporated on October 4, 1933, under the laws of Delaware as a non-stock, nonprofit organization. Its primary purposes were: (1) To assist in relieving the existing emergency by purchasing, processing, and distributing for consumption agricultural and other products as a means of removing surpluses and improving prices; (2) to supply these surplus agricultural and other products in the form of foodstuff, clothing, and fuel; and (3) otherwise to relieve the hardship and suffering caused by unemployment.

FSRC operations were financed wholly from funds received from the respective States, Territories, and the District of Colum-

bia. Funds thus received by FSRC were set up in the form of credits to the individual States and charges were made against such credits as materials requested were shipped to the States. In these operations, FSRC acted as purchasing agent for the individual States.

In addition to FSRC purchases, AAA bought agricultural products and livestock with its own funds and donated them to FSRC for processing and distributing in consumable form to the men, women, and children on relief. These operations resulted in a substantial movement of price-depressing surpluses of foodstuffs, grain, seed, livestock, and cotton to the benefit of farmers and of those on relief. In addition to farm products, FSRC moved substantial quantities of processed articles, including cotton-piece goods and cotton blankets. All costs of the commodities and products, including charges for processing, transporting, storing, and cost of administration, were paid for by FSRC from State funds, originally granted, in part, to the States by FERA.

FSRC bought both raw cotton and cotton fabrics in the open market on a competitive-bid basis in accordance with established Government procedure. All cotton fabrics were required to meet minimum specifications prescribed by FSRC. Raw cotton, cotton ticking, and cotton comforter material were used by the States to make cotton mattresses and cotton comforters. Mattresses and comforters were produced under the following three general methods:

1. In some States mattresses and comforters were made in workrooms where persons on relief were required to work under the supervision of State relief agencies. These workrooms were maintained by the SERA's, by the Civilian Works Administration, and by the Public Works Administration.

2. A few States negotiated contracts with commercial mattress-making concerns which utilized raw materials supplied to the States and charged specified amounts for the work performed.

3. In at least one State, mattresses were manufactured in a State penitentiary under an arrangement whereby the State was paid a specified amount for the labor involved.

Quantity and Cost of Cotton and Cotton Products Diverted.—In February 1934, FSRC initiated its cotton-purchase activities with the procurement of 1,023,903 cotton blankets at a gross delivered cost, excluding administrative expenses, of \$1,239,617. This was followed by purchases during the period July 1934 to April 1935 of a total of 130,254,000 yards of ticking, toweling, sheeting, and comforter covering material at a delivered cost of \$15,573,300. Raw cotton needed to produce the blankets and fabrics is estimated at 76,642 bales. Practically all the blankets were shipped to SERA's during February and March 1934 and the cotton fabrics were delivered during the period July 1934 through August 1935.

A total of about 168,283 bales of raw cotton was purchased between August 1934 and April 1935 at a gross delivered cost of \$10,757,378 or \$63.92 per bale of cotton diverted. Deliveries extended through November 1935.

For the program as a whole, the gross delivered cost of materials supplied, excluding administrative expenses, totaled \$27,-

570,295. The total quantity of raw cotton represented by the items supplied is estimated at 244,925 bales. The average gross cost per bale of cotton diverted was about \$112.57 (table 3).

TABLE 3.—*Summary of materials distributed, lint cotton used, expenditures, and per bale costs of the Federal Emergency Relief Administration Distribution Program*

Items	Units	Number of units	Estimated raw cotton equivalent—bales of 478 pounds net	Delivered cost excluding administrative expenses (dollars)	
				Total	Per bale
Raw cotton.....	Pound ..	84,141,264	168,283	10,757,378	63.92
Blankets	Each ..	1,023,903	76,642	1,239,617	219.37
Fabric:					
Ticking	Yard ..	19,196,200		2,575,922	
Toweling	do....	26,695,512		2,806,325	
Sheeting	do....	20,968,750	63,393,233	3,966,220	6,224,748
Comforter covering.....	do....	63,393,233		6,224,748	
Total or average.....			244,925	27,570,210	112.57

Outlook for This Type of Program.—Relief distribution programs, such as were conducted by FERA, were followed by somewhat similar projects initiated by various agencies of the United States Department of Agriculture. These projects are discussed in detail later under Cotton Mattress and Cotton Comforter Programs. Should it be decided in the future that new relief distribution programs are needed, the type of program to be made effective would depend on the one or more most applicable at that time. The types and quantities of material required would depend on the needs and other factors.

COTTON STAMP PLAN

Background of Program.—The Cotton Stamp Program may be divided into two parts: (1) The regular Cotton Stamp Plan and (2) the Supplementary Cotton Stamp Plan. The funds utilized for this program were provided under Section 32, Public No. 320, approved August 24, 1935, as amended.

The Cotton Stamp Plan was one of the several Government programs, operated during the 1930's and early 1940's, designed to increase domestic outlets for agricultural products and to give aid to relief families and others with low incomes. It was started in the fiscal year 1939-40 and was similar to the Food Stamp Plan which had been put into effect a year earlier. The experience gained in the operation of the latter was used in formulating the program for cotton.

Even though general economic conditions in the United States were much better than in the early 1930's, there were still millions of families with incomes insufficient to provide adequate food and clothing for the maintenance of their health and efficiency. The results of a survey, which became available a short time before the Food Stamp Plan was begun, showed that in 1935-36 there were 4.2 million relief and nonrelief families in the United States with an annual income of less than \$500 and 12.4 million with an income under \$1,000. Also, at the end of the 1937-38 and 1938-39

cotton seasons, stocks of American cotton increased to new record highs at a time when world consumption was well below average. Stocks of certain food products were also excessive. The existence of large numbers of people who were undernourished and inadequately clothed, together with large surpluses of certain types of food and other agricultural products, led to the formulation of the Food Stamp and the Cotton Stamp Plans.

Description of Program.—The regular Cotton Stamp Program, which began in the 1939-40 season, was continued through 1941-42; then it was discontinued, largely as a result of war developments. It encouraged domestic consumption of cotton by making available to designated persons in low-income groups, who were eligible to receive public assistance, additional purchasing power in the form of cotton order stamps for use in buying cotton goods. Two kinds of cotton order stamps were used. One was purchased by eligible persons and the other was donated to them. The general plan was that persons eligible to receive stamps were required to buy an amount of stamps approximately equal in value to their normal expenditures for cotton goods as a prerequisite to their receiving donated stamps of an equivalent amount. Such required purchases were intended as an assurance that the donated stamps would be used to increase consumption and not as a substitute for purchases that would otherwise be made.

As the program was originally set up in 1939, the required purchases approximated the average normal expenditures for cotton goods by families of similar sizes in the group having an annual income of less than \$500. The minimum and maximum total values of these purchases for each 3-month period were, respectively, \$2 and \$3 for eligible families of one or two persons, \$3 and \$5 for families of three or four persons, and \$4 and \$6 for families of five or more persons. By early 1941 purchases were allowed on a monthly basis and the monthly purchases varied from a minimum of \$1 for small families to a maximum of \$12 for large families. Under certain conditions, donated stamps were distributed without requiring the purchase of stamps, but donations on this basis represented only a small proportion of the total.

A Supplementary Cotton Stamp Program was made effective in 1941 as one phase of the general program to adjust cotton production to consumption requirements. It provided for making payments in the form of cotton order stamps for reductions in cotton acreage below the allotment determined for the farm under the provisions of the 1941 Agricultural Conservation Program. Payments were computed at the rate of 10 cents per pound on the normal cotton yield of the diverted acreage. The program provided for minimum payments of \$5 and maximum payments of \$25 for each farm. It also provided that in no event should a producer's cotton order stamp payments exceed a total value of \$50, irrespective of the number of farms owned by him. The cotton order stamps used were similar to those in use in the regular Cotton Stamp Program. But under the Supplementary Program, the minimum payments were less and the maximum payments permissible were much greater than under the regular program, in which they were related to the normal purchases of cotton goods by low-income families. No provisions were made to prevent farmers

from using these stamps in making their normal purchases of cotton goods.

Quantity and Cost of Cotton Diverted.—The cotton order stamps used in these programs were exchangeable at retail stores for any clothing, yard goods, or articles made of cotton grown and manufactured in the United States. The proportion of the retail prices accounted for by the value of the lint used varied from 6 percent or less for some items of clothing to about 47 percent for 50-pound cotton mattresses. An analysis of the distribution of the dollar spent at retail for the purchase of various items in a selected list of cotton goods, along with information on the items bought by low-income families, indicated that on the average for each dollar spent in purchasing cotton goods at retail by families with annual incomes of less than \$500, the equivalent of about 12 cents in 1939-40, 12.5 cents in 1940-41, and 16 cents in 1941-42 represented the cost of the raw cotton required to produce these items.

Expenditures for cotton stamps in the regular program amounted to \$40,000 during the fiscal year 1939-40, \$2,275,000 during 1940-41, and \$3,450,000 during 1941-42. In addition, an expenditure of \$17,802,000 was made under the Supplementary Cotton Stamp Program during the fiscal year 1941-42. On the basis of the estimated proportion of each dollar spent at retail for cotton goods by low-income families that went for the lint used, the stamps donated in the regular Cotton Stamp Program were adequate to buy, at the then current central market prices, the equivalent of about 96 bales (500 pounds gross weight) in 1939-40, 5,266 bales in 1940-41, and 6,133 bales in 1941-42. Stamps donated in the Supplementary Program were adequate to purchase the equivalent of about 31,648 bales in 1941-42. Cost to the Government, not including overhead and administration, per bale equivalent of raw cotton required to produce the goods distributed under the Cotton Stamp Program, averaged about \$416 in 1939-40, \$432 in 1940-41, and \$563 in 1941-42 (table 4).

TABLE 4.—*Summary of expenditures, lint cotton used, and per bale costs of the Regular and Supplementary Cotton Stamp Programs, fiscal years 1939-40 through 1941-42*

Item	Unit	Fiscal years			
		Regular Program			Supplementary Program
		1939-40	1940-41	1941-42	1941-42
Total expenditures for stamps	Dollars..	40,000	2,275,000	3,450,000	17,802,000
Lint cotton equivalent used (bales of 478 lbs. net)	Bales ...	96	5,266	6,133	31,648
Cost of stamps per bale equivalent of cotton.	Dollars..	416	432	563	563
Central market value of cotton per bale...	Dollars..	50	54	90	90

Potentialities and Outlook for This Type of Program.—Some indication of the potentialities of the Cotton Stamp Program as a means of increasing the effective demand for cotton goods, thereby increasing the income from cotton, may be obtained from data

on the number of families with low incomes, along with information on their normal purchases of cotton goods. In 1935-36 there were about 2.7 million nonrelief families in the United States with incomes for the year of less than \$500, about 6.2 million with incomes of from \$500 to \$1,000, and about 6 million with incomes of from \$1,000 to \$1,500. During the same period, annual incomes of about 1.5 million relief families were less than \$500, those of about 2 million were from \$500 to \$1,000, and those of about 0.9 million relief families were from \$1,000 to \$1,500. In addition, the annual incomes of about 2.5 million single individuals were less than \$500, of about 3.6 million they were from \$500 to \$1,000, and of about 2 million they were from \$1,000 to \$1,500.⁵

Estimates of annual expenditures for cotton goods by typical nonrelief families of specific income groups indicate that the average of such expenditures was \$17.90 for typical families with annual incomes of less than \$500, \$27.30 for families of annual incomes from \$500 to \$1,000, and \$36.73 for families with annual incomes of \$1,000 to \$1,500. Estimates of cash expenditures by relief families for cotton goods are not available, but such expenditures may not be so great on the average as those by nonrelief families with equivalent incomes, since part of the income of relief families was not in cash. But, for purposes of making estimates, the average annual expenditures at retail for cotton goods by relief families may be assumed to be about equal to those indicated for nonrelief families with equivalent incomes.

If the Cotton Stamp Plan had been expanded in 1939-40 to include the same number of relief and other low-income families in the respective income groups as reported by the National Resources Committee for 1935, and if the total value of the stamps donated to each family had been equal to their normal expenditures for cotton goods, an expenditure of about 75 million dollars for donated stamps would have been required for families with annual incomes of less than \$500, about 296 million dollars for families with incomes of less than \$1,000, and about 544 million dollars for families with annual incomes of less than \$1,500. If these donated stamps had been used to supplement and not to replace normal purchases, and if on the average about 12 percent of the retail price of the cotton goods purchased had gone for lint cotton, these expenditures at 1939-40 levels of raw cotton prices would have resulted in the removal of the equivalent of about 180,000, 710,000, and 1,306,000 bales, respectively, from the market. At the average 1941-42 cotton prices, and if 16 percent of the retail price of the cotton goods purchased had gone for lint cotton, these expenditures would have resulted in the removal of the equivalent of about 133,000, 526,000, and 967,000 bales of cotton, respectively, from the market.

It is highly improbable that the Cotton Stamp Program could be operated so that all donated stamps would be used exclusively to increase the demand for cotton goods and not to replace or to diminish normal purchases. But a substantial increase in consumption of cotton goods as a result of the operation of the Cotton Stamp Program would increase employment in the textile industry and in wholesale and retail establishments. Such increases

⁵ Data collected and made available by the National Resources Committee.

in employment would result in increasing incomes, which would, in turn, have some strengthening influence on the demand for cotton goods. But there are indications that, as the income of a family of a given size increases, less than 2 percent of the increase goes for the purchase of cotton goods. Furthermore, at least a substantial proportion of the increases in incomes brought about through increases in employment as a result of expansions in consumption of cotton goods due to the Stamp Program probably would go to low-income groups and, as low-income families would already be receiving donated stamps under the program, the increases in their demand for cotton goods as a result of the increases in income would probably be very small.

COTTON MATTRESSES AND COMFORTERS

Background of Program.—As the incomes of persons in the lower-income brackets rise, their annual expenditures for mattresses increase. For the year 1935-36, only 3.3 percent of the families with incomes under \$500 per year bought mattresses as compared with 7.7 percent of the families with incomes between \$1,000 and \$1,500 and 12.4 percent of the families with incomes between \$2,000 and \$3,000.⁶ A similar situation exists in purchases of comforters and other bedding items. The fact that low-income families do not constitute an effective demand factor suggested the plan of distributing materials for making mattresses and comforters as a low-cost method of disposing of some of the surplus and of providing needed Government assistance to low-income families without hurting established commercial production and distribution of these products.

It was considered probable that the program by demonstrating the superior value of mattresses made of raw cotton over those made of cotton waste and linters (of which most so-called cotton mattresses were made) might lead to a greater future commercial consumption of lint cotton for this purpose by domestic mattress manufacturers. It was also thought that such programs might stimulate increased commercial purchases of sheets, bedspreads, and other cotton household items by low-income families.

Description of Programs.—Counting the activities initiated during any given fiscal year as a separate program, there have been altogether five Mattress and/or Comforter Programs. These were in operation during the fiscal years ending in June of 1936, 1939, 1940, 1941, and 1942. Materials for making mattresses were distributed under all five programs, while materials for making comforters were supplied under programs conducted during the fiscal years 1939-40 and 1940-41. The funds utilized for this program were provided under Section 32, Public No. 320, approved August 24, 1935, as amended.

Both the first and the second programs were initiated by the Agricultural Adjustment Administration. Under these programs, the Federal Surplus Commodities Corporation acted as purchasing agent, by handling the procurement and distribution of the materials. All ticking was bought on a competitive-bid basis in accordance with Government procedure. Fabric was re-

⁶ Consumer expenditure studies made by the U. S. Department of Agriculture from information supplied by the Bureau of Labor Statistics of the U. S. Department of Labor.

quired to meet specification requirements, tests were performed by the National Bureau of Standards on samples drawn and submitted by agents of the FSCC. Raw cotton for the initial program was obtained from the Cotton Producer's Pool and from stocks held by the Commodity Credit Corporation. For the second program, however, the raw cotton was bought in the open market on the basis of competitive bids, because restrictions imposed on CCC with respect to prices at which cotton held by that agency might be sold, make it more economical to buy the cotton in the open market.

The cotton and cotton ticking were supplied by FSCC to State relief agencies and the mattresses were made up in workrooms of the Civilian Works Administration and of the Works Progress Administration. Mattresses made were then distributed under supervision of State welfare agencies to certified needy recipients eligible to receive surplus commodities.

The three programs beginning with fiscal year 1939-40 and ending with fiscal year 1941-42 were initiated by the Surplus Marketing Administration. As in earlier programs, procurement of materials was handled by the FSCC acting as purchasing agent. The previously established policy of considering requests originating with State relief agencies was continued. Where materials were donated pursuant to State agency requests, supervision of activities was entrusted to such State agencies. However, by far the major part of activities under these three programs was performed pursuant to a cooperative working agreement of the Surplus Marketing Administration, the Agricultural Adjustment Administration, and the Agricultural Extension Service. This agreement provided that SMA purchase the materials through FSCC in quantities requested by AAA and ship them to points specified by AAA. Families eligible to receive the raw cotton and the cotton fabrics were certified by AAA, which agency placed orders with SMA, received donated materials, and handled their distribution to persons designated by the Extension Service. The Extension Service organized community mattress-demonstration groups, received applications for mattresses, accepted the donated materials on behalf of the various communities, supervised the processing of mattresses and comforters, and assumed responsibility for the delivery of finished mattresses and comforters to eligible families.

Under the programs in effect from 1939-40 to 1941-42, the definition of persons eligible to receive surplus materials was extended to include low-income families, both rural and urban. Low-income farm families were defined as those having a total gross annual income of not more than \$400, at least half of which was derived from agricultural occupations. Low-income non-farm families were defined as those families other than farm families having a gross annual income of not more than \$500. Non-farm families were allowed a larger income to offset lower rents of farm families and the value of food for family use produced by farm families. The income period was originally specified as the calendar year 1939, but was later revised to cover the 12-month period preceding the effective date of the program.

All cotton fabrics procured under these three programs were bought in the open market on a competitive-bid basis, in accord-

ance with Government procedure. Inspection was by agents of FSCC with spot tests of samples by the National Bureau of Standards. The raw cotton donated for making of mattresses or comforters was either bought directly in the open market on a competitive-bid basis, or was obtained from the CCC in exchange at applicable differentials for better quality cotton purchased in the open market. This exchange tended to improve the stock position of CCC and at the same time make it possible for SMA to obtain cotton cheaper than would have been possible had purchases been made directly from CCC stocks.

Before the beginning of fiscal year 1942-43, military and essential civilian requirements for various cotton fabrics became so great that cotton ticking was difficult, if not impossible, to obtain for use in a program of this kind. In fact, the 1941-42 program was only designed to provide raw cotton for use with some of the ticking and comforter covering material that was left over from earlier programs. Furthermore, with the high level of employment and with the rise in consumer income, the need for such a program was lessened. Consequently, no program has been in effect since the fiscal year 1941-42.

Quantity and Cost of Cotton Diverted.—Under the five Mattress and Comforter Programs described, the equivalent of about 734,057 bales of cotton was used. Included were 656,768 running bales of low-grade, short staple lint cotton distributed in unprocessed form, 61,553,820 yards of mattress ticking (equivalent to about 61,060 bales of cotton of 478 pounds each), and 29,837,315 yards of comforter covering material (equivalent to about 16,229 bales of cotton).

By far the largest distribution of cotton and other materials occurred in the fiscal year 1940-41, when the equivalent of about 455,474 bales of cotton was donated. The raw materials supplied under the five programs were adequate for making about 6 million standard-size mattresses and about 3 million comforters. Nearly all of the comforters and about 5 million of the mattresses were made under provisions of the programs conducted cooperatively by the SMA, AAA, and the Extension Service.

The gross cost of these programs, exclusive of administrative expenses, totaled approximately \$42,686,226. This was equal to about \$58.15 per bale of cotton diverted (table 5).

Outlook for This Method of Disposing of Surplus Cotton.—In periods of high consumer income and low unemployment, the need for this type of program as a means of providing relief to low-income families is obviously not so great as in years of average or below-average general economic conditions. Even during periods of especially high employment and general prosperity, however, distress may still be found among certain segments of the population. Old age, sickness, floods, fires, or accidents are among the causes. If the high level of general consumer income and employment is accompanied by higher living costs, distress may also be found among families of fixed incomes or among wage earners whose incomes are inadequate to absorb such higher living costs. In either event the situation reflects a fall in real income. Furthermore, it may be considered desirable to give some Government assistance to those who do not suffer actual distress but whose

TABLE 5.—Summary of materials distributed, expenditures and per bale costs of Cotton Mattress and Comforter Programs, fiscal years 1935-36 and 1938-39 through 1941-42

Fiscal year ending June	Quantity of material					Approximate gross cost (excluding administrative)	
	Ticking		Comforter covering		Total raw cotton	Total	Per bale
	Yards	Raw cotton needed to manufacture	Yards	Raw cotton needed to manufacture			
		<i>Bales of 478 pounds net</i>		<i>Bales of 478 pounds net</i>	<i>Bales of 478 pounds net</i>	<i>Dollars</i>	<i>Dollars</i>
1936..	4,750,041	4,713	None	None	49,997	54,709	3,331,325
1939..	3,798,442	3,768	None	None	29,124	32,892	1,347,039
1940..	14,076,008	15,947	6,021,627	3,275	146,743	165,965	9,759,132
1941..	36,929,329	36,633	23,815,688	12,954	405,887	455,474	26,902,710
1942..	None	None	None	None	25,017	25,017	1,346,020
Total or average	61,553,820	61,061	29,837,315	16,229	656,768	734,057	42,686,226
							58.15

incomes fall sufficiently below the national average to make it impossible for them to attain what may be termed an "American standard of living."

It appears not improbable that once adequate supplies of cotton ticking and comforter covering materials again become available, a demand may arise for the reinstitution of cotton mattress and comforter programs. Should such programs be initiated, it may be expected that the quantities of cotton utilized annually would be related to the general economic conditions existing from year to year.

About 3.5 million farm and nonfarm families in the United States had incomes in 1942 of less than \$500.⁷ If it is assumed that national income in 1942 and its distribution may be regarded as normal for postwar conditions, a total of 3,500,000 families would be eligible to receive assistance on the basis of the same eligibility requirements as under the recent mattress programs. Assuming that each of these families has a need for two mattresses and two comforters, a total of about 800,000 bales of cotton would be consumed if all of such needs were supplied. Extended over a period of 10 years, this would involve the utilization of about 80,000 bales of cotton annually. If additional families were made eligible or if the eligible families received an average of more than two mattresses and two comforters, the quantity of cotton utilized would be greater.

This type of program has certain advantages over most other domestic surplus disposal purchase programs described herein, in that it utilizes low-grade, short-staple cotton for which market outlets are normally inadequate, and in that the cost per bale of cotton utilized is much less than the per bale cost of purchase programs which involve only manufactured articles.

⁷ Data from the 1943 issue of the Statistical Abstract of the United States.

COTTON BLANKETS AND SHEETING

Background of Program.—The background for this program was the same as that for cotton mattresses and comforters. Depressed living conditions among families representing a large segment of the population made it impossible for them to buy household items that they urgently needed, such as blankets and sheets, even though there were large surpluses of cotton and cotton products. Previous experience under FERA programs and under the Cotton Mattress and Comforter Programs indicated that distribution of surplus commodities to low-income families did not adversely affect established commercial distribution of items involved. Formulation of a purchase and distribution program for cotton blankets and sheeting was therefore considered a logical continuation of accepted practice of benefiting agriculture by improving low-standard living conditions.

Description of Program.—Under this program, which was in effect only during the fiscal year 1939-40, the FSCC, acting as agent for SMA, purchased cotton sheeting material and cotton blankets in the open market on a competitive-bid basis for distribution by State welfare agencies to families receiving public aid. The commodities bought were allocated to the States on the basis of availability of supplies, the extent of the eligible case load certified by the State and local authorities, and the requests made by the State Departments of Public Welfare. The rate at which the commodities were distributed was designed to supplement, and not to replace, the purchases needy persons were able to make and to encourage increased domestic consumption of cotton products. The funds utilized for this program were provided under Section 32, Public No. 320, approved August 24, 1935, as amended.

Quantity and Cost of Cotton Diverted.—Cotton sheeting material and cotton blankets, requiring in their production the equivalent of about 36,588 bales of cotton, each of 478 pounds net weight, were bought and distributed. Sheeting was bought in widths of 45 inches, 81 inches, and 90 inches. Blankets were in two sizes—standard bed-size, weighing 11 ounces per square yard, and baby blankets, weighing 10 ounces per square yard. The cost of the program totaled about \$3,804,000 and the average cost per bale of cotton used was equivalent to about \$126. Cotton needed to make these items totaled approximately 16,000 bales for the blankets and a little more than 14,000 bales for the sheeting. The delivered cost per bale, excluding administrative expenses, was about \$124 for the blankets and about \$128 for the sheeting (table 6).

Outlook for This Type of Program.—Distribution of blankets and sheeting under this program alleviated much of the most urgent distress at the time. This, together with the fact that cost of diversion was about double the cost of diversion under the Mattress and Comforter Program, brought suspension of further distribution. Later, with the stepping up of defense activities, the mill capacity was needed for military and essential civilian requirements.

As is indicated in the outlook for Mattress and Comforter Programs, there may be adequate justification for further distribution programs in the postwar period. A blanket and sheeting distribution project, though relatively expensive, could be insti-

tuted advantageously whenever cotton surpluses are burdensome. Under such conditions a program of that type would benefit farmers by reducing surplus stocks of cotton and would tend to raise the standard of living among low-income families.

TABLE 6.—*Summary of materials distributed, lint cotton used, expenditures and per bale costs of the Cotton Blankets and Sheeting Programs*

Item	Quantity	Raw cotton needed to manufacture	Gross cost (excluding administrative)	
			Total	Per bale
	<i>Square yards</i>	<i>Bales of 478 pounds net</i>	<i>Dollars</i>	<i>Dollars</i>
Sheeting	22,610,733	14,214	1,820,957	128.11
Blankets ¹	8,609,172	15,978	1,983,261	124.12
Total or average.....	31,219,905	30,192	3,804,218	126.00

¹ Includes 300,000 baby blankets (13 ounces each) and 1,896,000 regular blankets (2.97 pounds each).

DIVERSION FOR NEW-USES PROGRAMS

Need for Developing New Markets.—Total cotton consumption is brought about by hundreds of uses, most of which are individually small. Trends in the consumption of cotton reflect the operation of several factors among which may be included the influence of fluctuating economic conditions, population changes, variations or modifications in the nature of existing demand, substitutions resulting from the interchangeability of various fibers, and the development of new commercial outlets for cotton and its products.

Lack of integration to any appreciable extent in the cotton industry made difficult any effective efforts for the development of new commercial outlets for cotton. Activities actually carried on were usually independent investigations conducted on a relatively small scale. In time, the United States Department of Agriculture initiated and carried on studies of the utilization of cotton and cotton products. These were generally in the nature of laboratory and other investigations and served to fill a vital need of the cotton industry. However, the actual application of cotton products into new fields of commercial use was often passed by. A wide unbridged gap remained between existing investigations to expand cotton markets and the stage at which the new products could be incorporated into the commercial structure of the cotton industry and be reflected in increased cotton consumption.

This situation indicated the need for action programs under which new products and new commercial outlets for cotton could be encouraged. Section 32 of Public No. 320, 74th Congress, approved August 24, 1935, as amended, made possible the establishment of such programs. All the new-uses action programs discussed herein were conducted under provisions of Section 32 and utilized funds made available thereunder.

The new-uses cotton-diversion programs of the United States Department of Agriculture were all designed to bridge the gap between the research stage of development and the commercial

acceptance of the new products of cotton without governmental assistance. It is intended that through prescribing minimum specifications which must be met and through encouraging the manufacture and sale of the new products by incentive payments, or by purchase-and-trial use, while processing and distributing techniques for minimum costs are being attained, promising new markets for cotton may become firmly established on a self-sustaining basis. These programs may be divided into two types: (1) Those in which the Government pays only a part of the cost of the item, and (2) those in which the Government pays the entire cost of the item. Among those diversion programs falling into the first category are: (1) Cotton Insulation Program, (2) Cotton Bagging for Cotton Bales Program, (3) Cotton for Paper Program, and (4) Cotton for Binder Twine Program. Those in the second class include: (1) Cotton Mats for Curing Concrete in Roads Program, (2) Cotton Reinforcing Membrane for Bituminous Surfaced Roads Program, and (3) Miscellaneous Programs.

COTTON INSULATION

Background of Program.—The Cotton Insulation Program was initiated on its present basis in the spring of 1940 following a series of trial projects conducted under the Department's Miscellaneous Cotton Diversion Program of 1938. These trials indicated that insulation made of cotton was a physically suitable product which gave promise of developing into a continuing and self-sustaining outlet.

This potential new use for cotton was considered particularly well suited for attention of the Department in its new-uses action programs:

1. It involved the consumption of those qualities of cotton which were not required in large quantities in the manufacture of established products and it utilized fibers for which ready outlets were most difficult to find.

2. As this is a nontextile use, a larger proportion of the consumer's dollar goes for raw cotton than is the case when cotton is used for most textiles.

3. There is a vast undeveloped market for insulation, and this field offers large potential outlets for cotton even if the use of other types of insulation is expanded.

4. Cotton possesses such characteristics that it can be made into a product having all properties essential to a high-quality thermal insulation.

Description of Program.—This is an incentive program which provides payments by the Secretary of Agriculture⁸ to participants who process cotton insulation that meets specification requirements and who sell and deliver such insulation in accordance with program provisions. Business establishments that wish to engage in the processing of material that meets specifications, submit required applications. Upon approval of the applications, they become eligible to engage in the processing and sale of the material within the provisions of the program. During the period that the program remains in effect, a Government

⁸ The program is now being conducted by the Cotton Branch, Production and Marketing Administration.

inspector, stationed at each point of production, certifies material which meets the specifications. From May 1940 to November 1941, the rate of payment was 6 cents per pound of finished insulation, excluding backing material, if any. This is equivalent to approximately $5\frac{1}{4}$ cents per pound, gross weight, of cotton used in its processing. Because of the raising of standards in the specification requirements and the increased costs of cotton and other materials, the rate was increased to 9 cents per pound (equivalent to about 8 cents per pound, gross weight of cotton) in November 1941, where it has remained.

Quantity and Cost of Cotton Diverted.—Production of cotton insulation during the year ended June 30, 1941, totaled nearly 282,000 pounds and required for its processing about 660 bales of cotton; diversion payments were about \$16,900 or \$25.59 per bale of cotton consumed. In the following year, production was increased to 1 million pounds (using about 2,400 bales of cotton), at a cost of about \$31.85 per bale. This larger diversion cost per bale resulted from raising the incentive payment rate during the year from 6 cents to 9 cents per pound (see description of program) of insulation processed, sold, and delivered. Insulation production was further increased to 3.7 million pounds, and 9.4 million pounds during the fiscal years 1942-43 and 1943-44, respectively. For the first 7 months of the fiscal year 1945, the production of cotton insulation totaled 4.8 million pounds. Since November 1941 the cost of diversion has remained at about \$38.41 per bale of cotton used.

The total quantity of cotton insulation produced under provisions of these incentive payment programs from the start of operations in 1940 through January 1945, equals nearly 19.1 million pounds. This quantity required approximately 45,000 bales of cotton in its production. Incentive payments for this diversion totaled 1.7 million dollars, or an average of about \$37.87 per bale of cotton used (table 7).

TABLE 7.—Summary of cotton insulation produced, lint cotton used, expenditures and per bale costs of the Cotton Insulation Programs, fiscal years 1940-41 through January of fiscal year 1944-45

Fiscal year	Insulation production			Cost of diversion	
	Number participating manufacturers	Pounds of insulation	Raw cotton needed to manufacture (bales of 478 pounds net) ¹	Total	Per bale
1940-41.....	1	281,523	660	\$ 16,891	\$25.59
1941-42.....	4	1,010,662	2,368	75,413	31.85
1942-43.....	5	3,700,242	8,670	333,022	38.41
1943-44.....	7	9,368,498	21,951	843,165	38.41
1944-45 ²	7	4,774,853	11,188	429,737	38.41
Total or average..	19,135,778	44,837	1,698,228	37.87

¹ Based on 12 percent shrinkage factor. Recent indications are that shrinkage is less than the 12 percent experienced in earlier stages of the program.

² Seven months, July 1944 through January 1945.

The Outlook for Cotton Insulation.—To the present, cotton insulation has been employed primarily for insulating residential structures. In this use insulation made of cotton has demonstrated many desirable characteristics. They include high in-

insulating value, lightness, resiliency, noncapillarity, flame resistance, permanency, repellency to mildew and to household pests, and ease of handling and installing.

The insulating value of cotton and its weight per insulating unit in comparison with 10 other types of insulating material are shown in table 8.

TABLE 8.—*Insulating value and weight of cotton as compared with 10 other types of insulation*¹

Type of insulation	Index of insulating values per inch of thickness (cotton as 100)	Index of weight (cotton as 1.0)
Cotton	100	1.0
A	96	3.9
B	96	4.1
C	96	10.3
D	92	5.3
E	92	10.3
F	89	1.7
G	80	1.7
H	80	16.7
I	77	10.3
J	73	10.3

¹ Computed from tests made by various agencies.

Because of its many desirable properties, cotton insulation has large potentialities in numerous fields of use as well as for insulating residential structures. Some of these possibilities are listed in table 9.

In addition to the items listed in table 9, cotton insulation may be found effective and economical for use in walk-in and commercial refrigerators, refrigerated showcases, refrigerator warehouses, water coolers, hot-water jackets, marine and aircraft construction, hot-air ducts, air-conditioning equipment, perishable food-shipping containers, fire extinguisher tanks, storage tanks, as well as for other purposes.

If cotton is used to the extent of 10 percent of the potential total requirements as computed in table 9, approximately 438,000 bales of cotton will be required annually. Should it be used for one-fourth of the potential market listed in such tabulation, more than 1 million bales of cotton would be consumed annually. If those fields of use not enumerated in table 9 are added to those included in the tabulation, the consumption of cotton could easily reach 500,000 to 750,000 bales annually even though cotton were employed to the extent of only about 10 percent of the computed potential market for all types of insulation.

By lowering the density per board foot without adversely affecting its physical properties, cotton insulation has been improved since the program was initiated. Although the product in its present form is of very high quality, further improvement may reasonably be expected. For cotton to become firmly established in this field of use may require Government assistance to this infant industry for several more years.

Some phases of processing techniques for lower cost remain to be worked out. At present, the cost of containers in which insulation is packaged represents about 9 percent of the manufacturers' ceiling prices of the finished product, excluding incentive payments. Cheaper means of packaging need to be developed.

TABLE 9.—*Potential annual use of insulation of all kinds for indicated outlets*

Item	Annual production		Insulation per item	Raw cotton needed to manufacture
	Year	Number of items		
		<i>1,000 items</i>	<i>Pounds</i>	<i>1,000 bales of 478 pounds net</i>
Residential housing:				
Already constructed	(1)	2,000	200	937
New construction	(2)	1,500	616	2,165
Nonresidential construction:				
Thermal insulation	1942	(3)	(3)	405
Acoustical insulation	1942	(3)	(3)	405
Farm structures other than dwelling	1935	204	266	207
Tourist cabins	1929-33	20	161	7
Refrigerator cars and trucks; household refrigerators	(6)	(6)	(6)	201
Passenger train cars, streetcars, and busses	(7)	(7)	(7)	17
Automobiles and house trailers	(8)	(8)	(8)	42
Total				4,386

¹ Assumes insulating 20 million residences over a 10-year period in attic only.

² Estimated postwar annual construction rate; insulation to be used in side walls and ceiling.

³ Construction awards in 37 States report 865 million square feet of floor space. Assumes surfaces requiring insulation equal to floor space.

⁴ Assumes effective use of 2,000 square feet of 2-inch insulation per farm for barns, poultry, and storage houses, and other buildings. Represents 3 percent replacement rate.

⁵ Assumes 5-percent replacement rate on 400,000 cabins.

⁶ Assumes 16,000 refrigerator cars produced or rebuilt annually in the postwar period and using 964 pounds cotton insulation per car; 60,000 refrigerator trucks (1937 production) using 375 pounds cotton insulation per truck; 1,750,000 household refrigerators and 575,000 ice boxes (1939 production) using 17 to 22 pounds cotton insulation per unit.

⁷ Assumes 1,500 passenger train cars insulated annually with 540 pounds of cotton insulation; 3,000 streetcars insulated with 236 pounds cotton insulation and 25,700 busses (20 percent of 1941 registration) insulated with 222 pounds of cotton insulation.

⁸ Assumes 2,800,000 passenger cars (1939 production) insulated with 5 pounds of cotton insulation, and 36,000 house trailers (1943 production) insulated with 105 pounds of cotton insulation per unit.

Although the manufacturing concerns participating in the program have made much progress in establishing distribution channels, much educational work needs to be done. Consumers and salesmen need to be shown how the product should be used and sold. Architects, engineers, builders, and others should be apprised of the physical properties of the product. Building codes of cities and towns in many instances need to be revised so as to permit the use of cotton insulation.

Present indications are that when processing and distribution techniques for minimum cost have been worked out, manufacturers can economically afford to use without Government assistance low-grade $1\frac{3}{16}$ -inch and $\frac{7}{8}$ -inch cotton and possibly medium qualities at prices equal to or considerably above those existing in the late 1930's. Should cotton prices continue at present levels, at least some Government payments might continue to be necessary in order for cotton to be used to its fullest extent in this potentially large outlet. The qualities of cotton suitable for such purpose include those of Good Ordinary to Low Middling in grade and about $1\frac{3}{16}$ -inch in staple, as well as cotton of higher grades and longer staples.

COTTON BAGGING FOR COTTON BALES

Background of Program.—Cotton grown in the United States has long been packaged in jute wrappers that were imported from other countries or manufactured domestically from the imported fiber. Such wrappers frequently presented an unsightly appearance, were thought to protect the cotton fiber inadequately, to add excessive weight to the package thereby increasing transportation costs, and by weight variation to cause frequent disputes involving costly arbitration. Another adverse effect was the frequent commingling of the jute fibers with the cotton lint, causing manufacturing difficulties and sometimes resulting in lowering the quality of the manufactured products. Further, it was thought by some that a foreign fiber should not have complete domination of the bale wrapper market in the United States at a time when serious efforts were being made to expand cotton consumption and reduce excess cotton supplies.

The Cotton Bagging for Cotton Bales Program was initiated on an incentive payment basis in the summer of 1938. This followed a series of trial projects of small quantities in 1937 and 1938 in which the total cost was paid by the Government under provisions of the Department's miscellaneous programs. These trials and the experimental tests made earlier indicated that wrappers made of cotton possess physical properties which should tend to overcome some of the objections resulting from the use of other types of bale wrappers.

Description of Program.—The Cotton Bagging for Cotton Bales Program provided for incentive payments by the Secretary of Agriculture to participants who manufactured cotton patterns meeting specification requirements and who sold and delivered such patterns to eligible purchasers in accordance with the program provisions. The incentive rate of payments varied from time to time and ranged from 15 cents to 40 cents per pattern, equivalent to slightly less than 3 cents to about $7\frac{3}{4}$ cents per pound of raw cotton required in its manufacture.

Under the program made effective in the summer of 1938, the incentive rate of payment was 28 cents per pattern, determined on the basis of competitive bids. Maximum price which could be charged purchasers by the manufacturer under that program was 45 cents per pattern. For later programs, it was found more practicable to omit the maximum price provisions chargeable by the processor, to determine in advance the rate of incentive payments which would be made, and to allocate maximum quantities to be manufactured, sold, and delivered by participating manufacturing concerns. Maximum prices for bagging of cotton were later established by the Office of Price Administration. These maximum prices, however, were separate and distinct from program provisions under which participating manufacturers operated.

Under the program made effective in 1939, the incentive rate of payments was reduced to 25 cents per pattern, at which level it was continued until the 1941 program became effective.

In the program made effective in 1941, the initial rate was 15 cents per pattern, but because of later sharp advances in raw materials and labor costs, the rate was increased to 35 cents per

pattern in August. This rate remained in effect until the spring of 1943, when it was increased to 40 cents per pattern. It remained there until processing was discontinued in September 1944.

Eligible purchasers under the programs, from the inception until 1942 were defined substantially as follows:⁹

- a. Cotton producers and cotton ginnerers.
- b. Cottonseed oil mills and any individual, firm or organization customarily handling coverings for cotton bales.
- c. Any individual, firm or organization which, at the time of the purchase of cotton bagging, presented to the seller a statement under oath to the effect that such individual, firm or organization had an order or orders for the sale of such bagging to cotton producers, cotton ginnerers, or cottonseed oil mills.

In 1942 an insufficient supply of conventional types of bale wrappings appeared probable by reason of the war. As a measure designed to assure adequate supplies of bale-wrapping material, and to acquire a stockpile of wrappers made from cotton, the Cotton Bagging Program was increased as to quantity. To acquire such stockpile the Commodity Credit Corporation was designated as an eligible purchaser, in addition to those which had been so designated in preceding programs. Most of the participating bagging manufacturers elected to sell to the Commodity Credit Corporation. The expected shortage of the conventional type of bagging did not eventuate. With an adequate stockpile on hand, and with an urgent need for the processing equipment to make military and essential civilian goods, manufacture of the material was not continued after September 30, 1944. Most manufacturers had discontinued processing bale wrappers several months earlier.

Quantity and Cost of Cotton Diverted.—Production of cotton bagging under incentive programs of the Department began in August 1938 and ended in September 1944. During that 6-year period a total of about 7,100,000 cotton patterns was manufactured under the programs at an approximate total cost of \$2,300,000. Nearly 77,000 bales of cotton were consumed in the making of that quantity of bagging (table 10).

The costs of diversions by fiscal years ranged from \$18.92 to \$36.77 per bale of cotton, and averaged \$30.00 per bale. The fiscal year of largest production was 1942-43, when nearly 2,200,000 patterns were made requiring nearly 24,000 bales of cotton. Eight concerns participated at some time in the manufacture of cotton patterns under the programs.

Outlook for Cotton Bagging.—Acceptance in late 1942 by all segments of the cotton industry of a tare-allowance principle whereby 7 pounds per bale is added to the gross weight of cotton-wrapped bales in computing value, removed one of the barriers to the establishment of this use for cotton on a self-sustaining basis. There remain, however, several measures which need to be put into effect if bagging made of cotton is to be produced and distributed on a self-sustaining basis.

⁹ From July 27, 1938, to April 29, 1939, such eligible purchasers were required to be located in, or to serve, one-variety or improved-cotton communities. On April 29, 1939, this requirement was eliminated.

TABLE 10.—*Summary of bagging produced, lint cotton used, expenditures, and per bale costs of the Cotton Bagging for Cotton Bales Programs, August 1938 through September 1944*

Fiscal year ending June 30	Participating manufacturers	Quantity produced (patterns)	Raw cotton needed to manufacture (bales of 478 lbs. net) ¹	Incentive payments	
				Total	Per bale of cotton diverted
	<i>Number</i>	<i>Number</i>	<i>Bales</i>	<i>Dollars</i>	<i>Dollars</i>
Aug. 1938 through June 1939	1	699,681	7,612	195,911	25.73
1940	4	534,320	5,813	143,213	24.64
1941	6	1,005,562	10,939	206,965	18.92
1942	4	1,363,152	14,829	454,913	30.68
1943	4	2,181,016	23,727	792,283	33.39
1944	5	1,245,962	13,554	498,385	36.77
July through Sept. 1944	1	27,250	296	10,900	36.77
Total or average		7,056,943	76,770	2,302,570	29.99

¹ 15 percent allowed for shrinkage in manufacture.

Important among these are the following:

1. **Lower manufacturing cost** may be achieved most effectively by the establishment of mills designed specifically for the production of bale wrappers. Something may also be accomplished in this direction by the manufacture of bale wrappers on already established equipment as off-season projects designed to fill periods of low production of other goods.

2. **Techniques** might be developed for manufacture of a bale wrapper consisting in part of cotton and in part of jute or some other fiber, if the level of prices for cotton is too high for the material to be made wholly of cotton. In this manner a bale wrapper having a weight between the present 12-pound jute and the 4½-pound wrapper of cotton could be made. Such wrapper would be of greater and of more uniform strength than the wrapper made from jute alone, and should be conducive to an improved appearance of the cotton bale.

Physical standards for wrappers may be necessary.

3. **Production and other costs** should be worked out so that bale wrappers consisting in whole or in part of cotton could be priced at such levels by manufacturers that handlers of the material could obtain reasonable price mark-ups without necessitating a higher price level to the ultimate users than that which prevails for wrappers made wholly of jute. The establishment of continued marketing-service activities by processors and others, to create and maintain demand for wrappers having as a component at least some cotton, is needed.

If these measures are made effective it should tend to make economically practicable the use of cotton of Good Ordinary to Low Middling in grade, and of 1 inch to 1⅝ inch (or shorter) in staple in the manufacture of cotton bale wrappers. Within the limits of the total market in this field of use the lower the cost of cotton in relation to other fibers the greater the possibility of its use in quantity.

A pattern weighing 4.5 pounds made entirely of cotton requires for its manufacture about 5.2 pounds of lint cotton. Patterns so made, sufficient to wrap a 12,000,000 bale cotton crop, would re-

quire about 130,000 bales for their manufacture. (This is on the assumption that physical standards will be established to permit only the use of unreworke fibers.) If a pattern requiring for its manufacture about 2 pounds of cotton and 4 pounds to 6 pounds of jute is manufactured, approximately 48,000 bales of cotton will be required annually for a 12,000,000-bale crop. With the use only of unreworke fibers in the manufacture of bale wrappers, second-hand fibers and wrappers could probably be utilized in those segments of the paper, roofing, and other industries that are not now open to lint cotton.

COTTON FOR PAPER

Background of Program.—The total market for fine writing paper has been increasing for many years. During recent years, however, the ratio of such paper made from fabric clippings (largely cotton) has decreased sharply.

In 1925, about 27 percent of all fine paper had some clipping content. By 1935 this percentage had declined to about 15 percent. This decrease was partly due to improvement in techniques of manufacture of sulfite paper; partly to the more prevalent use of fast dyes in fabrics, making it more difficult to secure satisfactory clippings; and partly to the relatively high cost of those clippings which were satisfactory for use in paper manufacture.

In 1938, fine-paper manufacturers using fabric clippings became interested in the possibility of using lint cotton, cotton card strips, cotton comber noils, and high-grade cotton linters for a portion of their raw-material requirements. The Government was requested by the Writing Paper Manufacturers Association to make effective a program for the trial use of these materials. A program was operated during parts of 2 years.

Description of Program.—The program provided for incentive payments to be made by the Secretary of Agriculture to the Writing Paper Manufacturers Association for prescribed maximum quantities of lint cotton, cotton card strips, cotton comber noils, and cotton linters used in the manufacture of paper by the association or by others designated by it with the approval of the Secretary of Agriculture.

The first program was made effective on January 3, 1940. It provided for an incentive payment to equal an amount by which the cost of the fibers (f.o.b. user's mill) exceeded 3 cents per pound, gross weight. In no instance, however, was the incentive payment to exceed 10 cents per pound. The actual average of incentive payment under the first program was about 6.27 cents per pound of fiber, gross weight, equivalent to about 6.54 cents per pound, net weight. Manufacturers said they were pleased with the materials used under the initial program but, feeling that experience should be gained with larger quantities, requested another program.

On March 25, 1941, a second program was approved by the Secretary of Agriculture. The rate of incentive payment by the Secretary was fixed at 4½ cents per pound, gross weight, on 75 percent of fibers purchased and used under the program. The effective incentive rate of payment was, therefore, three quarters of 4½ cents, or 3.385 cents per pound, gross weight, equivalent to

3.56 cents per pound, net weight. Limitation was placed on the maximum quantity in total and of any one quality which any one manufacturer could use under the program.

The fibers were bought in the open market by the Association at prices and of qualities approved by the Department of Agriculture. They were shipped to members of the association participating in the program. Members using the material supplied evidence that they diverted the fibers into fine paper manufacture. Examination of the records of the participating member concerns was made by representatives of the Secretary of Agriculture to determine whether provisions of the program had been complied with.

Quantity and Cost of Cotton Diverted.—In the program for the fiscal year ending June 30, 1940, approximately 1,066 bales, and in the program for the fiscal year ending June 30, 1941, about 5,115 bales of cotton, were utilized. Diversion costs in the 1940 program were about \$33,400 and in the program for 1941, \$82,500. Per bale of cotton used, the average cost was approximately \$31.35 in 1940, and \$16.14 in 1941 (table 11). Nineteen manufacturing concerns participated in each of the programs but there was one substitution as to participating manufacturers in the program for 1941. Of approximately 35 concerns in the entire industry, 20 concerns, mainly the largest ones, participated.

TABLE 11.—*Summary of quantities of cotton used, expenditures, and per bale costs of the Cotton for Paper Programs, fiscal years 1939-40 and 1940-41*

Fiscal year ending June 30	Number of participating manufac- turers	Quantity diverted		Cost of diversion (dollars)	
		Pounds	Equivalent bales 478- pounds net weight	Total	Per bale
1940	19	509,608	1,066	33,426	31.35
1941	19	2,444,813	5,115	82,528	16.14
Total or average.....		2,954,421	6,181	115,954	18.76

Outlook for Cotton, Cotton Mill Waste, and Cotton Linters in the Manufacture of High-Grade Paper.—The purposes of the programs of 1940 and 1941 were to determine whether costs under commercial conditions of processing are lower in using raw fibers than in using fabric clippings, and whether the physical properties of the resulting paper made from such fibers equal or excel those of paper made from fabric clippings or other commercial materials. As the purposes of the program had been attained, no further programs were considered desirable at that time. Sizable quantities of some of the types of fibers tried have been used without the benefit of incentive payments since the Government programs were terminated. Some types of cotton-mill byproducts, such as thread wastes, not tried out under the programs, have also been utilized as a consequence of the program. Of the "fine" paper production in the United States during the 5 census years 1930

to 1935 (data for 1933 are not available) the average quantities per census year made wholly or partly of rags were as follows:

<i>Rag content (percent)</i>	<i>Quantity (pounds)</i>
100 -----	29,000,000
50 but under 100 -----	71,200,000
Under 50 -----	107,800,000

If the midpoints (75 percent and 25 percent) represent the rag content of the second and third groups of cotton products used in the manufacture of high-grade paper, it would appear that the use of rags or clippings, excluding shrinkage in manufacture, averaged 109,000,000 pounds per year. In terms of lint cotton this poundage would be equivalent to approximately 275,000 bales of 478 pounds net weight, excluding shrinkage in processing. If lint cotton, cotton-mill byproducts, and cotton liners were used to the extent of one-half that of clippings and rags in the manufacture of fine papers, about 120,000 bales of them would be required. It was recently reported that late in 1944, the members of the Writing Paper Manufacturers Association were utilizing liners and perhaps some types of cotton-mill byproducts equivalent to about 30 percent of their requirements for raw materials. Indications are that under conditions prevailing in late 1944, members of the industry can economically afford to pay about 7 cents per pound for such raw materials. Developments will necessarily determine whether the industry can afford to pay that much for the fiber in the postwar years. The maximum that the industry may be in a position to pay will be governed to a major extent by the price of fabric clippings and the price of fine papers. The prewar average price of fabric clippings which were utilized at that time for a similar purpose was several cents lower than the 7-cent level.

It is not improbable, however, that one or more of the materials tried out under the Government programs, along with thread waste, will be in demand by the fine-paper industry after the war. Which of these will be utilized will probably depend substantially on their relative price levels. In this connection, a recently approved program for the diversion of cotton burs includes, as a potential outlet for cotton-bur fiber residue, its utilization as a raw material alone or in conjunction with lint cotton in paper making. It is not improbable that at reasonable prices sizable quantities of that fiber could be utilized for paper making. Processing of bur fibers is expected to begin within the next few months.

It should be noted that the manufacturers who use fabric clippings, lint cotton, cotton liners, and cotton-mill byproducts consist of a segment of the industry that makes ledger and bond papers, and employs processes that differ substantially from those utilized in the paper industry as a whole, including all other writing papers.

COTTON FOR BINDER TWINE

Background of Program.—Binder twine used in the United States before the war was either imported in finished form or was produced in domestic plants from imported raw fiber. Because of the war, fiber normally used in the making of binder twine be-

came relatively scarce and much of it was needed for the manufacture of marine cordage and for other uses by the armed services.

In order to assure an adequate supply of binder twine for the 1943 farm crops, it was necessary to turn to a twine consisting, at least in part, of a substitute material. Cotton binder twine had never been manufactured on a commercial scale but there was evidence that binder twine, utilizing cotton yarn in its manufacture, was physically suitable for the uses for which the usual type of binder twine was employed. At that period of the emergency, cotton appeared to be the only available substitute material.

When the program was under consideration, a portion of the 1943 binder twine requirements had been processed and distributed. This and other factors made it advisable that substitute binder twines be made available at costs no higher than those of regular henequen binder twines. However, because of higher costs of cotton yarn, the most practical means by which twine made wholly or in part of cotton could sell at a price no higher than that charged for binder twine already processed from henequen was by governmental payments.

Because of the urgent need for providing an adequate supply of binder twine for the 1943 crops, the War Production Board requested, and concurred in the need for, the program.

Description of Program.—The Cotton for Binder Twine Program provided that the Secretary of Agriculture pay the processor of binder twine up to 25 cents per pound for all cotton yarn used as an extender with other fibers (mainly henequen) in the production of binder twine. The payments were to represent the amount by which the cost of cotton yarn (f.o.b. user's mill) exceeded 7 cents per pound, net weight, but were limited to a maximum payment of 25 cents per pound for cotton yarn. From April 20, 1943, to October 1, 1943, the use of cotton yarn equivalent to 25 percent of the weight of the finished twine was required in the production of binder twine by a directive letter from the War Production Board. The use of such yarns required only minor machinery changes. The payment program became effective on January 25, 1943, and specified that the cotton yarn used thereunder be bought not later than June 30, 1943, and be manufactured into binder twine not later than November 30, 1943. The program authorized the use of a maximum of 30 million pounds of cotton and a total expenditure of not to exceed \$7,500,000.

A special provision of the program authorized incentive payments to cover the manufacture in the Dominion of Canada of binder twine made in whole or in part of cotton yarn, provided the binder twine so manufactured was brought into the United States before November 30, 1943, for disposition in domestic markets. This provision was authorized because the United States production could not fill domestic requirements for binder twine. Two plants (one a branch of a company with headquarters in Chicago, Ill.) manufactured cotton binder twine under this provision of the program.

The program did not require inspection of binder twine processed, but periodic examinations were made of records relating to the program by agents of the Secretary of Agriculture in order to determine compliance with all provisions.

Quantity and Cost of Cotton Diverted.—This program was initiated in the fiscal year 1943 and all diversion was completed during the calendar year 1943. A total of 16,992,224 pounds of cotton yarns, requiring for its manufacture the equivalent of about 40,526 bales of raw cotton, was used in the manufacture of binder twine. Approximate total expenditures under the program equaled \$4,248,000, fractionally less than 25 cents per pound of cotton yarn, or about \$104.82 per bale of cotton used in making the cotton yarns. All told, 13 different manufacturing plants participated in the program.

The Outlook for Cotton Binder Twine.—During the same period in which cotton was being used as a component in binder twine, commercial manufacturers made tests to ascertain the practicability of using various fibers other than cotton as extenders for henequen. Jute and tow fibers were found generally satisfactory for use in the manufacture of a binder twine that would meet farmers' needs, although it was reported that the product did not equal the quality of cotton-henequen binder twine. Because available cotton yarns were urgently needed for the fabrication of goods for the armed services and essential civilian requirements, the use of cotton for binder twine was discontinued and other fibers were substituted. In January 1945, sisal tow fibers and short-length henequen were being employed as extenders for the longer henequen fibers in the processing of binder twine.

Except under very unusual circumstances, it does not seem likely that much if any cotton will be used in normal times in this way unless processing and other costs are greatly reduced.

COTTON MATS FOR CURING CONCRETE

Background of Program.—For several years before the initiation of this program, investigations relating to the development of more effective methods of curing concrete were conducted by the Public Roads Administration of the Federal Works Agency (then the Bureau of Public Roads of the U. S. Department of Agriculture).

It was found that the quality of the finished concrete is influenced by temperature changes within its mass, particularly during the early curing period. To control wide temperature variations, highway construction engineers practiced various methods of curing, the more important of which included the use of wet burlap, wet earth, paper, straw, or hay and liquid agents. Curing was accomplished by spreading one of these materials over the freshly poured concrete. Use of these materials was attended with various disadvantages, some of which were reflected in the quality of the cured concrete.

In the early 1930's, the use of cotton mats was proposed as a potentially effective and economical method of curing concrete. The proposal stemmed from an idea that specially constructed cotton mats, composed of felted layers of low-grade cotton or cotton wastes bound between osnaburg casings, would provide green concrete with a quiltlike protection against excessive heat or cold and would supply a spongelike medium for water needed in the curing process. Trial tests of cotton mats were made by the Public Roads Administration of the Federal Works Agency

and the Texas State Highway Department. Results of these tests indicated that substantial quantities of cotton could be utilized if, by widespread demonstration and trial use of cotton mats, it were found that they were advantageous for that purpose.

Description of Program.—This was a purchase program, and the mats were all bought in June 1936. Before purchases were made, the Department received applications from State highway commissions for cotton mats and, if these applications were approved, the mats requested were furnished without cost to the approved applicants. The number of mats requested determined the quantity bought. Mats meeting prescribed specifications were bought by the Department on the basis of competitive bids. The cooperating State agencies agreed to use the mats in accordance with approved methods, to maintain records, and to submit reports with respect to results observed from their use. The mats were used over an extended period. Some that were supplied under the program were still in use in March 1945.

Quantity and Cost of Cotton Diverted.—A total of 89,535 cotton mats, requiring in their manufacture about 4,135 bales of cotton, was donated to the road commissions of 23 States during the fiscal year 1936 for use in concrete curing. The cost of these mats, excluding administrative expenses, totaled about \$365,464, equivalent to approximately \$88.38 per bale of cotton consumed.

Outlook for Cotton Concrete Curing Mats.—Results reported from the use of cotton concrete curing mats under provision of the Department's 1936 program tended to substantiate the expectations of proponents of this curing method and brought about the inclusion of cotton mats as an alternate curing method in specifications of most highway departments.

Shortly after the mats were distributed for trial use, several concerns began the energetic promotion of this use for cotton without financial assistance by the Government. The promotional activities have been continued to the extent practicable during the war, production being limited by the shortage of osnaburg cloth, which furnished the fabric casing for the mat.

As fabrics become available, it is expected that larger quantities of cotton concrete curing mats will be produced and sold on a self-sustaining basis.

Reports received from cooperating agencies indicate that cotton mats can be reused about 50 times for curing purposes. For a standard size mat, this is equivalent to the curing of about 556 square yards of pavement. About 22½ pounds of raw cotton are required to make one mat, measuring 22½ feet wide by 6 feet 9 inches long, including a 6-inch flap along one width edge.

Available estimates indicate that for the 5-year period, 1936-40 inclusive, concrete construction of roads, streets, alleys, and airports averaged approximately 56 million square yards. Based on the premise that each mat can be used to cure 556 square yards of pavement, approximately 100,000 mats, requiring in their manufacture about 4,750 bales of cotton, would have been needed annually, had cotton been used exclusively. Exclusive use of cotton for curing similar construction in the succeeding 3 years would have involved the consumption of about 7,100 bales in 1941, about 11,400 bales in 1942, and about 6,000 bales in 1943 (table 12).

TABLE 12.—*Estimated cotton mat requirements and raw cotton consumption for curing concrete construction,¹ 1936-43*

Period	Pavement ²	Cotton mats required ³	Equivalent bales raw cotton ⁴
	<i>Square yards</i>	<i>Number</i>	<i>Number</i>
Average 1936-40.....	56,023,029	100,841	4,747
1941.....	83,971,062	151,148	7,115
1942.....	134,222,494	241,600	11,372
1943.....	71,089,671	127,961	6,023
Average 1936-43.....	71,174,799	128,115	6,031

¹ Data with respect to construction of concrete buildings, bridges, dams, and other structures necessitating the use of concrete and presenting opportunities for cotton mat curing are not available and are not included in computations.

² Includes road, street, alley, and airport construction. Data from Portland Cement Association.

³ Based on use of one standard size mat to cure 556 square yards of pavement.

⁴ Based on use of 22½ pounds raw cotton for each mat. All bales are of 478 pounds net weight.

Information as to the cost of curing concrete pavements with cotton mats is provided in a published report of the Public Roads Administration¹⁰ which states:

The cost of the mats, as delivered to certain designated points in the States, averaged approximately 48 cents per square yard of net useful coverage. For an average life of 50 uses, this is equal to about 1 cent per square yard. This value checks reasonably well with the average mat cost per use in eight States for mats purchased in the open market of approximately 1¼ cents per square yard.

The cost of curing concrete pavement as revealed by reports from 19 States, excluding the material cost but including supervision, labor, and transportation, averaged 2.15 cents per square yard. These costs were, of course, greatly influenced by local factors, chiefly hourly wage rates and weather conditions. For instance, the minimum State average of 1.08 cents occurred where labor was quoted as low as 20 cents per hour, while the maximum State average of 3.11 cents corresponded to an hourly wage rate of 68 cents per hour. For individual projects the range was from slightly over ½ cent to 6 cents per square yard. On one project, heavy rains made sprinkling unnecessary about one-fourth of the time. This helped to reduce curing costs 40 percent below the average for this State.

The average total curing cost, obtained by adding the average material and usage costs, is 3.15 cents per square yard (1 cent material cost plus 2.15 cents usage cost). However, as certain States omitted such items as cost of water for sprinkling, transportation of mats to and from the project, and the winter storage, it would seem safer to state that the average total cost should not exceed 3.5 cents per square yard. In nine States the cost of curing with cotton mats was compared with the cost of curing with other acceptable materials. A summary of these direct comparisons indicates that the cost of cotton mat curing is in general about the same as other commonly accepted methods used under similar conditions.

COTTON REINFORCING MEMBRANE FOR BITUMINOUS-SURFACED ROADS

Background of Program.—It is not uncommon for bituminous-surfaced roads to crack and otherwise disintegrate, thereby necessitating early and frequent repair. Preliminary tests carried on by the South Carolina Highway Department indicated that by the insertion of a reinforcing membrane, such as a woven cotton fabric, cracking could be reduced and the disintegration slowed.

¹⁰ MARR, R. A., JR. THE COST OF CURING CONCRETE PAVEMENTS WITH COTTON MATS. U. S. Public Roads Admin. Public Roads 20: 215-216, 219, illus. 1940.

To secure appropriate information on the effects of cotton fabric when used for this purpose under commercial practices of road building and under varying climatic conditions, a road-fabric program was made effective by the United States Department of Agriculture in 1936.

Description of Program.—Provisions of the program were similar to those described under cotton mats for curing concrete. Cotton fabric was made available to the State agencies requesting material and agreeing to use such material in accordance with approved methods, to maintain records, and to submit reports with respect to results observed. The fabric, which was required to meet prescribed specifications, was bought by the Department on the basis of competitive bids. All purchases were made in June 1936, and deliveries to State agencies followed shortly thereafter. The fabric was utilized in bituminous road construction as needed. No date was specified for completion of activities. Geographic locations of the States participating were such that the material was utilized under the extremes of climatic conditions prevailing in the United States.

Quantity and Cost of Cotton Diverted.—Altogether, 24 States requested and received a total of 6,106,000 square yards of fabric. This was enough for the construction of 578 miles of road 18 feet wide. Manufacture of this fabric required about 4,059 bales of cotton. The cost of the program, excluding administrative expenses, totaled about \$363,189, equivalent to \$89.48 per bale of cotton diverted or to about \$628 per mile of road constructed.

Outlook for Cotton as a Reinforcing Membrane for Bituminous-Surfaced Roads.—Following broadly the methods of application recommended on the basis of earlier trials conducted by the South Carolina Highway Department, three types of fabric were tried out for the purpose. In general, results obtained did not indicate that the use of cotton extended the life of the road surface. This does not mean definitely that cotton may not serve a useful purpose for bituminous roads. Rather, it indicates that there are some difficulties to be overcome before any widespread utilization of a reinforcing membrane in highway work can be anticipated. It may be that methods should be developed to assure more complete impregnation of fabric with asphalt, different types of fabric may be required, a change in procedure of application may be called for, or some means of controlling traffic while the road surface is being properly cured may be needed.

Concerning the method of application, one suggestion, received after the use of fabric under the program, proposed enveloping the entire roadbed in an asphalt-impregnated cotton fabric. This suggestion advocates a road-building procedure involving six steps: (1) Excavating the earth or the roadbed to the proper depth, (2) shaping and compacting the bottom and sides of the excavated area, (3) laying an asphalt-impregnated cotton fabric in the bottom of the roadbed and up the sides of the excavated area, having the fabric of sufficient width to fold several inches over the top of the earth to be back-filled, (4) back-filling the earth scooped out of the excavated area and folding the upper edges of the asphalt-impregnated cotton fabric over the earth back-filled, (5) laying asphalt-impregnated cotton fabric flat over the full width of the road overlapping the folded flaps of the cotton

fabric—completely enveloping the back-filled earth, and (6) covering the entire mass with asphalt or other material to proper depth to make the finished surface of the road.

Another recommendation involves unreeling of the fabric through a vat of hot asphalt immediately before it is placed on the road, as a means of assuring proper and complete asphalt impregnation.

The quantity of raw cotton required per mile of standard-width road would depend in part upon the type of fabric used. The three types of fabric tried under provisions of this program used an average of 7 bales of cotton per mile of road 18 feet wide. The lightest construction used required about $4\frac{1}{2}$ bales per mile of road, the medium construction slightly over 6 bales per mile, and the heavy construction about $7\frac{1}{2}$ bales per mile. If the roadbed were encased in cotton fabric in the manner outlined, the quantity of raw cotton consumed per mile of road would be more than doubled.

There are approximately 3 million miles of rural roads in the United States. Of this total about 1.4 million miles are surfaced. Although data indicate that a very large additional mileage of road must yet be improved, until present deficiencies in the use of fabric are overcome it does not appear that any sizable quantity of cotton will be employed for this purpose.

MISCELLANEOUS COTTON DIVERSION PROGRAMS

Background of Program.—Manufacturing concerns, particularly those of relatively small size, frequently found it impracticable to begin energetic sales efforts to market new cotton products until trial use under field conditions had shown their real merits and potentialities. Trial projects of many potential new uses for cotton were carried on by the United States Department of Agriculture from 1937 through 1939.

Description of Program.—These programs were designed to cover diversions of comparatively small quantities of cotton and cotton products. Cotton and cotton products were bought from time to time and diverted to Federal, State, and other governmental agencies, and to colleges, universities, and nonprofit organizations, for use in connection with one or more of specifically authorized purposes, none of which was then a customary or normal commercial use.

Uses authorized under the program were selected carefully from a list of suggestions by Government agencies, colleges, universities, trade organizations, and individuals on the basis of indicated practicability. The number of authorized purposes was increased with each program. Under the program for the 1938-39 fiscal year, the following purposes were authorized:

1. As a covering or membrane either by itself or in conjunction with, or as reinforcing for, other materials, in connection with:
 - a. Irrigation, drainage, run-off, or any other type of ditch, canal, or channel designed to carry or direct a constant or intermittent flow of water;
 - b. Levees, revetments, or any other construction for protection against flowing or moving water, or erosion;
 - c. Construction, maintenance, or protection—temporary or permanent—of dams, reservoirs, and water-storage facilities and controls, or the inlets there-to, or the outlets therefrom;

- d. Fills or cuts for roads or highways, or in connection with other fills or cuts;
- e. Seeding or reseeding, or preventing erosion of lawns, terraces, or in connection with the improvement or cultivation of land areas; and
- f. Surfacing airport runways, roads, bridges, paths, walks, or in connection with the similar surfacing of other areas.
2. As wind barriers, windbreaks, or in any other manner in connection with the control or direction of blowing or air-borne soil or sand.
3. As a protection (covering or otherwise) for fruits, vegetables, or other agricultural or horticultural products during growing, ripening, harvesting, curing, packing, storing, or other processes.
4. As a covering or otherwise for shading or protecting tree seedlings, shrubs, trees, vegetables, plants, flowers, vines, or other agricultural or horticultural products or growths, where not customarily and commercially so used.
5. As a portable or permanent covering, hood, or tent in connection with fumigating, spraying, or dusting fruits, vegetables, vines, trees, plants, or other agricultural or horticultural products or growths.
6. As a covering or other part of cages or enclosures, designed for the propagation of insect parasites or similar purposes.
7. As a covering, screen, or otherwise to prevent the egress of insects or other pests which might cause infestations.
8. As a protective covering or apparatus to prevent or lessen the nuisance caused by congregation of various species of winged wild life.
9. As a protection for colonies of hives of bees.
10. As a roof or outside covering material, as insulation, or as any other part of houses, cabins, cottages, outbuildings, or other permanent or semi-permanent structures, including buildings, of a sectional or other type, which may be taken apart and reused from season to season, from time to time, or from location to location.
11. As a covering or pattern for bales of cotton, bales of hops, or other agricultural or horticultural products.
12. As a package, bag, container, covering, or baling, or other protection or wrapping, either by itself or in conjunction with other materials, for wool, nuts, grains, fruits, vegetables, seeds, or other agricultural or horticultural products during or after clipping, harvesting, gathering, curing, packaging, sorting, transporting, merchandising, or during any other phase of marketing, preparing, or transporting such commodities, where not customarily and commercially so used.
13. As a covering or protection for fleece (wool or mohair) before clipping.
14. As a covering or otherwise to check or eradicate undesirable weeds, grasses, or other undesirable agricultural or horticultural growth.
15. As a material in the construction of traps, cages, or containers for game and other birds, fowls, or animals.
16. For such other purposes as the Secretary may specifically find will effectuate the purposes of Section 32, Public Law No. 320, 74th Congress, as amended.

With the approval of each program, details with respect to participation were disseminated and applications for material were received for consideration.

All agencies submitting applications indicated their intention of utilizing materials donated for a specified purpose. They also indicated that they would use every care to see that the material would not enter the normal channels of trade and commerce, and they agreed to submit, on request, reports with respect to the use of the material.

In actual operation formal applications followed discussions or correspondence between applicants and representatives of the Department of Agriculture which determined the feasibility and extent of projects and the types of cotton products to be tried. The later formal application indicated the types and quantities of materials believed desirable for trial use. Detailed specifica-

tions for the materials were prepared by the Marketing Section, Division of Marketing and Marketing Agreements, Agricultural Adjustment Administration.¹¹ With respect to some of the specifications, frequent consultations were held and assistance was received from members of the Utilization Section, Cotton Marketing Division, Bureau of Agricultural Economics, now a part of the Southern Regional Research Laboratory.

All cotton products supplied under these programs were bought in the open market on a competitive-bid basis and were tested to assure compliance with specification requirements.

Because of the trend of world events, which led to the channelling of domestic energies into defense activities and later into work directly related to the winning of the war, trial projects to develop new commercial outlets for cotton were suspended at least temporarily with the close of the 1939 fiscal year program. The Miscellaneous Cotton Diversion Programs, though temporarily suspended, accomplished certain objectives. These included the development of some uses to the point where they were shown to be commercially practicable, the initiation of incentive programs on a commercial scale following successful demonstrations under the programs, and the preliminary findings that several other trial uses merit further attention.

Uses developed for cotton fabrics to the point of commercial acceptance under these programs included their use in fumigating tobacco seedbeds and for protecting drying fruits.

Tobacco blue mold is a disease that destroys the leaf tissues of the tobacco plant. It prevails in nearly all tobacco-growing States in this country; its control is of great economic importance to tobacco growers. One of the most successful control methods is by fumigation of tobacco seedbeds with benzol and related compounds such as monochlorobenzene and paradichlorobenzene. To hold the fumes within the beds a closely woven cotton fabric was spread over the seedbeds at night. This was in addition to the regular "tobacco canvas" cover used to prevent damage from frost. The cotton fumigation fabric was removed from the beds in the morning so that normal plant growth would not be hindered. Trials indicated that cotton fabric was highly suitable for this method of blue mold control and that the procedure was economical. This use for cotton fabric has been generally accepted by tobacco growers.

Field tests utilizing cotton fabric for the control of insect infestation of drying fruits successfully demonstrated the effectiveness of cotton fabric for this purpose. These trials, which were conducted under commercial growing conditions in California, demonstrated that raisin-moth infestation of peaches was reduced from an average of 35.2 percent for unprotected lots to an average infestation for protected lots of 8.7 percent. In some instances, there was 100-percent infestation in exposed lots and no infestation in protected lots. Similar favorable results in reducing insect infestation were observed from use of cotton fabric in the drying of figs, raisins, apricots, and nectarines, as well as in the protection of tomato plants from damage caused by curly top disease.

¹¹ The unit which prepared the specifications and conducted these programs is now a part of the Cotton Branch, Production and Marketing Administration.

Following trial demonstrations under these programs, commercial producers of dried fruits accepted the protective principle of utilizing cotton fabric in their normal drying practices.

Cotton bagging for cotton bales and cotton insulation were two of the products developed under these programs. Later, incentive programs were initiated to encourage the commercial production and distribution of each of these cotton products.

Trial uses of cotton baggings as wrappers for sea island cotton and for upland cotton were included in both the 1938 and 1939 fiscal year programs. For sea island cotton two types of cotton fabric were tried; one was 40 inches in width and the other was 57 inches. In the early stages of the trial it was found that the 57-inch fabric completely encased the bale and was preferable to the narrower fabric. As the production of sea island cotton is relatively small and no large quantities of wrapping fabrics of any kind are required annually, the trial use sufficed to show the physical adaptability of the material. Very few, if any, cotton wrappers have been used for sea island cotton since the termination of the trial projects, but farmer representatives still are interested in the use of this material when it again becomes available after the war.

For upland cotton—the kind which represents more than 95 percent of the cotton crop of the United States—a cotton fabric 45 inches in width was tried. It proved physically adaptable for wrapping upland cotton bales. To gain commercial acceptance for this use of cotton, programs whereby governmental payments were made to participating manufacturers were carried on from 1939 to 1944. Details of those programs are discussed in another part of this report.

The use of cotton for insulation marked its first use in a product nontextile in character. The early type of cotton insulation consisted of a cotton quilting $\frac{1}{2}$ -inch thick, weighing 3.7 pounds per square yard, and composed of a series of cotton rovings widthwise. These were stitched together at right angles with cotton thread to form a quiltlike material. The product was required to meet a fire-resistance test and had a thermal conductivity (k90 factor) of about 0.37.

Trial use of the quilt type of cotton insulation gave generally satisfactory results. Continued investigations under field conditions quickly brought forth decided improvements with the development under the program of a flame-resistant "batt" or "blanket" type of insulation having a density of 2 pounds per cubic foot and a k90 thermal conductivity of 0.24. The newly developed product was originally bound by a sheet of light cotton fabric but later was backed with a water-repellent paper which served as a moisture barrier. Later improvements under the program further reduced the weight of the material to about $\frac{3}{4}$ pound per cubic foot and increased flame-repellent qualities, although a high degree of insulating efficiency was maintained. This improved material is the type that is being manufactured under the terms of the Department cotton-insulation incentive program.

In connection with other uses for which trial projects were initiated under these programs, preliminary findings were frequently inconclusive, although there was indication that some of

these proposed uses possess practical potentialities. It appears that the potentialities of those uses which were tested to a limited extent, as well as of other uses for which actual trials were not initiated, merit further attention. Some of the potential cotton outlets in this category are: Cotton as a reinforcing membrane for asphalt in the lining of ditches and canals; cotton-fabric lining without bituminous materials for irrigation and drainage ditches; cotton-fabric linings for terrace-outlet channels, cotton fabric for use in repairing metal flumes, storage tanks, and similar structures; cotton fabric for stabilizing road cuts and fills; cotton as a reinforcing membrane for bituminous-surfaced airport runways; cotton fabric for shading and mulching tree seedlings; and cotton covers for protecting colonies or hives of bees.

Quantity and Cost of Cotton Products Diverted.—Under the first Miscellaneous Diversion Program, conducted during the latter part of the 1936-37 fiscal year, a total of 72,000 square yards of material was bought and donated to cooperating agencies at a gross delivered cost, excluding administrative expenses, of \$6,836. The quantity of raw cotton used to make this quantity of fabric is estimated at 46 bales. The estimated delivered cost per bale of cotton diverted was \$148.61.

The second Miscellaneous Cotton Diversion Program was carried on during the fiscal year 1937-38. Under that program a total of 1,555,000 square yards of material, utilizing about 1,394 bales of cotton in their manufacture, was diverted. The gross delivered cost of diversion, excluding administrative expenses, totaled \$133,829, equivalent to about \$96.00 per bale of cotton diverted.

A third Miscellaneous Cotton Diversion Program was in effect during the 1938-39 fiscal year. A total of 1,727,000 square yards of material, equivalent to about 2,100 bales of raw cotton, was bought and donated to cooperating agencies under that program. The gross delivered cost of the material, excluding administrative expenses, totaled \$244,234, or about \$116.30 per bale of cotton diverted.

For the three programs as a whole, about 3,340,000 square yards of cotton materials were purchased and distributed to cooperating agencies; this was equivalent to the diversion of 3,540 bales of cotton at a gross delivered cost of \$384,899 and an average cost of \$108.73 per bale of cotton diverted.

The variations from year to year in the cost per bale of cotton diverted were due primarily to differences in the types of cotton products being tried rather than to changes in cotton prices.

The quantities of cotton products diverted, the equivalent bales of cotton required in their manufacture, and the cost of diversion are summarized in table 13.

Projects to determine the physical adaptability of cotton for the various authorized purposes were established in almost every State, in the District of Columbia, and in the Panama Canal Zone. About 50 distinct types of materials were supplied. Some types were provided in different widths, in color, or with special treatments for mildew, flame, water, and spot resistance. Trial projects for some of the purposes provided for under the program were not initiated due to the program's temporary suspension in 1939.

TABLE 13.—*Summary of quantities of cotton products diverted, lint cotton used, expenditures, and per bale costs in the Miscellaneous Cotton Diversion Programs, fiscal years 1936-37 through 1938-39*

Fiscal year	Material purchased	Cotton needed to manufacture	Delivered cost, excluding administrative expenses	
			Total	Per bale
	<i>Square yards</i>	<i>Bales of 478 pounds net</i>	<i>Dollars</i>	<i>Dollars</i>
1936-37	71,739	46	6,836	148.61
1937-38	1,555,243	1,394	133,829	96.00
1938-39	1,727,224	2,100	244,234	116.30
Total or average.....	3,354,206	3,540	384,899	108.73

Outlook for Miscellaneous Uses.—Trial project programs of the type here outlined necessarily must be of a continuing nature, if optimum results in developing new uses of cotton on a commercial basis are to be achieved. The programs would probably not in themselves utilize large quantities of cotton, but they are needed to fill the long-existent void between laboratory research relating to new uses for cotton and the introduction of such uses into commercial channels. Putting these programs into operation would serve to demonstrate to industry and to others cotton's commercial possibilities for specified new markets. The active cooperation and participation by industry in the programs would be anticipated and encouraged.

COMPARISON OF THE VARIOUS ACTION PROGRAMS

Comparison of the various action programs treats with the costs of their operation and with the influence they exert. For purposes of analysis, the subject is presented under five subheadings as follows: (1) Relative Expenditures for Each Program, (2) Effect on the Value of the Cotton Crop, (3) Effects on Consumption, (4) Incidence of Costs, (5) Distribution of Benefits.

RELATIVE EXPENDITURES FOR EACH PROGRAM

Domestic cotton-surplus disposal programs undertaken by the Federal Government in recent years have included five programs designed to increase domestic consumption of American cotton by donating cotton and cotton products to low-income families and seven programs designed to expand domestic outlets by developing and encouraging new uses for cotton. Programs of the latter group were initiated to demonstrate the feasibility of using cotton for these purposes and to overcome the inertia to establishing such uses on a commercial basis, with the expectation that they would be continued and expanded without Government payments after processing and distributing techniques for minimum costs had been developed and the new market established.

Four of the seven new uses programs were carried out on a part-cost contribution by the Government. The other three of these programs and all of the five programs for low-income families were on the basis of Government payment of the entire cost. Be-

cause of the differences in the proportion of the costs paid by the Government and differences in the total cost of utilizing cotton for various purposes, there is a wide divergence in the amount of Federal expenditures required to dispose of a given quantity of cotton during a particular period under these several methods.

Of the several programs covered by this report, those involving payments of only a part of the costs of the cotton or of the cotton products require much smaller Government expenditures per bale of cotton utilized than do those in which the Government pays the entire costs. For example, the estimated approximate Government expenditure per bale of raw cotton utilized under the several programs was as low as \$18.76 in the Cotton for Paper Program, \$30 for the Cotton Bagging for Cotton Bales Program, and about \$38 for the Cotton Insulation Program; whereas, under the Cotton Stamp Plan, the estimated cost to the Government was \$546 per bale of raw cotton. Even under the Red Cross Program of 1932 and 1933, where cotton cloth, ready-made garments, blankets, and sheets were bought at wholesale and when prices were low, the cost amounted to about \$202 for each bale of cotton required to produce the goods distributed (table 14).

The Cotton Mattress and Comforter Program required the least Government expenditure (per bale of cotton utilized) of the programs for which the entire costs were paid. This program required Government payments per equivalent bale of raw cotton used of a little over \$58 for the 5 years in which it was in effect. Under the Cotton Blankets and Sheeting Program it is estimated that the cost per equivalent bale of raw cotton utilized was \$126, with cotton sheeting costs slightly less per equivalent bale of raw cotton used than cotton blankets. (For additional comparisons see table 14.)

It should be pointed out that a considerable part of the differences in the comparative Government expenditures for the several types of programs as described above and as shown in table 14 is due to differences in the quality of cotton utilized and to differences in the periods in which the programs were in operation. Furthermore price-strengthening loans or other similar influences not usually associated with supply-demand-price relationships tended to increase the cost of operating these programs. Increased costs due to such factors, however, would prevail whether the programs were operated by the Government or by private enterprise. The relatively low costs of the cotton diverted into paper, cotton bagging, and cotton insulation are due in part to the fact that the quality of the cotton utilized was lower than the average quality utilized under most of the other programs. However, after allowing for these differences the costs to the Government are less for these programs, in which only a part of the costs are borne by the Government, than in most of the other programs. The quality of cotton used under the Mattress and Comforter Program was also below that used in producing the goods distributed by the Red Cross or utilized under the Cotton Stamp Plan or the Blankets and Sheeting Program. Nevertheless, the lower cost per bale of cotton used under the Mattress and Comforter Program is mainly due to the fact that the raw cotton represents a very large percentage of the total cost of the program, whereas when blankets, sheeting, shirting, shirts, dresses, etc., are bought,

TABLE 14.—Comparative approximate Government expenditures per bale of cotton utilized under different types of Surplus Disposal Programs, together with market prices of cotton

Type and name of program	Period in which program was in operation and average market price per bale for that period		Cost per 478-pound net weight bale of cotton required in producing the items involved ²	Influence on value of current American cotton crop per dollar spent ³
	Fiscal year except as indicated	10-market value of Middling $1\frac{1}{16}$ -inch ¹		
Programs for low-income groups:		Dollars	Dollars	Dollars
1—Red Cross Cotton	Aug. 1932 to Dec. 1933	39.80	201.97	0.10
2—FERA Program..	Feb. 1934 and July 1934 to Apr. 1935	63.50	112.57	.19
3—Cotton Stamp Plan	1939-40 to 1941-42	65.65	546.25	.08
4—Mattresses and Comforters	1935-36 and 1938-39 to 1941-42	60.30	58.15	.52
5—Blankets and Sheeting	1939-40	50.45	126.00	.20
New-uses programs involving payments of partial costs:				
6—Cotton Insulation	1940-41 to 1944-45	91.60	37.87	1.42
7—Cotton Bagging for Cotton	Aug. 1938 to 1943-44	74.35	29.99	1.48
8—Cotton for Paper.	1939-40 to 1940-41	52.75	18.76	(*)
9—Cotton for Binder Twine	1942-43 to 1943-44	102.00	104.82	.53
New-uses programs involving payments of all costs:				
10—Cotton Mats for Roads	June 1936	61.65	88.38	.53
11—Cotton Reinforcing for Roads..	1936	59.40	89.48	.53
12—Miscellaneous ..	1937-39	46.95	108.73	.27

¹ Simple average for each of the years involved (Aug.-July for market value instead of fiscal year) irrespective of the relative size of the programs during each of the years, except as noted.

² Costs excluding administrative costs divided by the estimated quantity of cotton utilized.

³ The estimated influence of these programs toward increasing the value of the then current American cotton crop is based on estimated average supply-price relationship in recent years as shown in U. S. Dept. Agr. Tech. Bul. No. 755, Cotton-price Relationships and Outlets for American Cotton. They represent changes that normally would be expected if all the cotton and cotton products used in these programs represented net increases in demand for cotton and if the influences of these increases were not nullified by price-support loans or other developments.

⁴ Average of 10 markets from 1940-41 to January 31, 1945.

⁵ These data include cotton linters, card strips, and cotton comber noils, as well as lint cotton. The average cost per pound was somewhat greater for lint cotton than for the other materials, but for the last year in which the program was operated the payments were the same for each type of material and were equivalent to only \$16.14 per bale.

even at wholesale, a large part of the cost goes for the manufacturing of these items.

EFFECT ON VALUE OF COTTON CROP

The quantities of the cotton consumed under most of these programs were too small of themselves to have had any noticeable effect on prices for cotton; in fact, the programs were not designed as price-support measures. Had all the cotton and cotton goods used in these programs represented net increases in the demand for cotton, such increases would have tended to increase the total value of the then current American crop by about 30 cents on the average for each dollar spent by the Government on all these pro-

grams combined, ranging from about 8 cents for the Cotton Stamp Program to about \$1.48 for the Cotton Bagging for Cotton Bales Program (table 14). But all the cotton and cotton products disposed of under these programs, particularly the donations to low-income consumer groups, may not have represented net increases in demand for cotton. In addition, the existence of certain factors, such as price-strengthening loans referred to under "Relative Expenditures for Each Program," tended to nullify any effects of such demand increases on prices.

EFFECTS ON CONSUMPTION

A total of approximately 1.4 million bales of cotton was used in the 12 programs covered by this report. Approximately 180 thousand of the 1.4 million bales were for new uses and about 1.2 million bales were for programs designed primarily for low-income families to relieve distress. All of the programs were, at least in part, designed to reduce the surplus of cotton. It cannot be determined definitely, but probably a large part of the cotton used in the programs for low-income families represented net increases in consumption during the effective period of such activities. However, some indirect influences, discussed under "Distribution of Benefits," may tend also to bring about long-time increases in cotton consumption. All of the cotton utilized in connection with the new-uses program no doubt represented a net increase in cotton consumption. In addition, the programs relating to most of the new uses have a continuing effect on increased consumption after the programs are over; that is their purpose. By incentive payments in the early stages of development provided for, enterprising manufacturers and distributors are encouraged to exploit new markets for cotton and its products and to develop procedures by which increased use for cotton may be continued on a self-sustaining basis after techniques of manufacture and distribution of minimum costs have been attained.

INCIDENCE OF COSTS

The incidence of costs of the domestic cotton surplus disposal programs relates to the direct and to the indirect costs of these activities, as well as to their immediate and long-time application.

Direct Costs.—The direct costs cover expenditures for each activity and include both commodity or incentive payment costs and administrative costs. Except for administration of the Red Cross Cotton Program of 1932-33, direct costs of these programs were paid by the Government. Such costs ended with the termination of each program.

Under the Red Cross Program, costs of administration were paid by the American Red Cross. Suppliers of articles distributed by the Red Cross may also have borne part of the direct cost, since they undertook to supply such articles without profit.

In the new-uses-for-cotton programs, some part of the direct cost may be borne by participants since the incentive payments are designed to offset only in part the initial higher costs of processing cotton for the new use and of introducing the new cotton products into commercial channels.

Indirect Costs.—The indirect costs are not so easily allocated as the direct costs. In evaluating them properly, they should be

considered both from the short- and from the long-time points of view. The following evaluation is based upon conditions that would prevail in the absence of price-strengthening loans. The reason for this is that such loans tend to obscure the effects of these programs on both the cotton growers and the consumers of cotton goods.

The immediate influence of the operation of these programs was to increase consumer demand for cotton and cotton goods. Such increase in demand would tend to be associated with early increases in prices to consumers, if all other factors remained unchanged.

Increased costs due to such factors, however, would prevail whether activities for increased cotton consumption were carried on by the Government or by private enterprise. In addition, the programs covered by this report were designed primarily to alleviate distress, increase cotton consumption, and reduce the cotton surplus rather than to have a lifting effect on cotton prices. But with large supplies of cotton on hand any advances in prices to consumers (when and if they occurred by reason of increased cotton consumption) may represent merely an upturn from depressed levels rather than prices which are too high in relation to other commodities. This applies with respect to direct and to indirect costs discussed herein. It does not vitiate the great need for increased cotton markets to lessen any painful adjustments which may be required in the production of cotton.

Over a period of years the incidence of indirect costs of these programs or of any other activities, governmental or private, to increase cotton consumption may be influenced by collateral developments. As the United States is but a segment of the world cotton market, changes in the supply and demand situation in one part of this market would tend, in the absence of some form of control, to be reflected in changes in price throughout the market. Over a period of time long enough for adjustments to be made, the spread between the farm price of cotton and the retail price of cotton goods should not change materially as a result of such programs. Then, with given conditions of production, indirect costs would tend to fall as follows:

1. If the production of cotton and of other competing fibers were not increased, higher prices for cotton would tend to result from the increased demand and the indirect costs would then be borne by consumers in the form of higher prices for finished goods.
2. If the production of cotton or of competitive fibers were so expanded in the United States or in other countries as to offset the influence of increases in demand on prices, there would tend to be a slight advance in prices but the cost to consumers would not be changed materially.
3. If cotton production in the United States were to remain practically unchanged while the production of cotton in other countries or the total production in all countries of fibers competitive with cotton increased, the influence of increases in demand on the prices of cotton might be about offset by the influence of such increased production. Under these conditions, there would be little change in the general levels of prices for cotton and

for cotton products and little additional costs would be assessed against consumers.

Other indirect costs include costs represented by smaller commercial sales to recipients of donated materials to the extent that donations reduce purchases that would otherwise have been made by such recipients. Similarly, competition of new cotton products with commodities already established in such field of use may represent losses by the established industries to the extent of their displacement. Cotton has suffered and is now suffering similar losses to a considerable degree. New uses for cotton would tend to reverse this trend. The costs, however, would be borne to the same degree were the new uses a product of nongovernmental activities. In some instances, as in the case of cotton insulation, the unexploited market is so vast that the introduction of a competitive product need not necessarily mean the displacement of materials already in use. Rather, it may bring about increased total utilization of all products. There would, of course, be competition by all products for a share of the consumer's dollar.

DISTRIBUTION OF BENEFITS

As in the case of costs, an analysis of the distribution of benefits of the domestic cotton surplus disposal programs involves consideration of the direct and indirect benefits as well as their immediate and long-time application.

Direct Benefits.—The principal direct beneficiaries of the Government distribution programs were the low-income families who were recipients of donated materials. Processors, conveyers, and other handlers also benefited directly to the extent of increased business as a result of their participation in converting the raw materials into finished goods and in moving the goods to points of use.

In the new-uses activities, program participants receive incentive payments designed to offset, in part, that cost of gaining acceptance of new products that is in excess of the cost normally associated with the production and distribution of established products. By the development of new markets, such concerns, in turn, assist in reducing the surplus supplies of cotton. Additional direct benefits of the new-uses activities are shared to varying degrees by other economic segments which contribute to the utility of the finished product.

Indirect Benefits (Immediate).—Under conditions of equilibrium between the supply of cotton and the demand for cotton goods, the increased demand brought about by these programs should tend immediately to raise the price of cotton goods. It is believed, however, that imperfections in the market mechanisms, even in the absence of price-strengthening loans, are such that increases in consumer demand for cotton goods are not accurately synchronized with changes in the demand for raw cotton. Under such conditions the spread between prices received by producers for raw cotton and prices paid by ultimate consumers for cotton goods may change somewhat, with the result that increased consumer demand for cotton goods may not be accurately reflected in immediate increases in prices and incomes to cotton growers.

Actually, the supply of cotton and, in many instances, that of cotton products during most of the effective periods of the pro-

grams far exceeded effective consumer demand at the prevailing relatively low prices. An increase in demand, under such conditions, merely absorbs available stocks with little or no effect on prices. Processors were then operating much below capacity and, in many instances, below a level of efficient production. An increase in demand as a result of program activities would tend to reduce burdensome mill stocks and make possible greater efficiency of operation. Immediate benefits were, therefore, mainly confined to a reduction in stocks of cotton and cotton products and to greater processing activity.

It is thought that the programs for distribution of cotton materials to low-income groups may have promoted interest in similar products among families not eligible to participate. Any acceleration of purchases by such families as a consequence of program activities may be considered an indirect benefit. Then, as a result of these programs, recipients of donated materials were reported to have expended a somewhat larger-than-normal share of their available spending power on articles associated with the donated materials. For illustration, some who received mattresses are reported to have bought beds, springs, and bed linens which they otherwise would not have procured. The programs, therefore, tended to extend substantially beyond their actual size (in terms of cotton diverted) and tended to increase the demand for many related commodities, with indirect benefits extending back all along the line to the various handlers and processors of such commodities.

Indirect Benefits (Long time).—The indirect benefits of these programs over a period of years are generally subject to the same factors that tend to influence cost. As was indicated previously, the spread between prices paid by consumers and prices received by farmers would not change materially as a result of such programs. Theoretically, therefore, the long-time indirect benefits of increasing demand would be influenced primarily by production trends both of cotton and of competing fibers as follows:

1. If the production of cotton and of competing fibers were not increased, cotton growers and producers of competing fibers in all countries would tend to benefit by reason of the strengthening price influences resulting from increased demand brought about by these programs.

2. If production of cotton or of competitive fibers were so expanded in the United States or in other countries as to offset the influences of increases in demand on prices, the indirect influences of the programs would be to increase outlets for cotton and for competing fibers. Prices would tend to be slightly increased, but there would not be any material change in farmers' incomes per unit of production.

3. If United States cotton production were unchanged while the production of cotton in other countries and the total production of competitive fibers in all countries increased, any influence on cotton prices brought about by increased demand would be partly offset by the influence of increased cotton production in other countries and by greater total production in all countries of competing fibers. Under these conditions the principal indirect benefits resulting from the operation of these programs would be in-

creased outlets for additional quantities of fiber competitive with cotton and for foreign-grown cotton.

Practically, increased demand by reason of these programs probably had little if any effect on either the volume of production or the price of cotton or its products. Benefits flowed primarily from the effectiveness of these activities in reducing existent surplus stocks or in creating outlets for future production which otherwise would have been surplus to probable needs.

The programs of distribution to low-income groups were designed specifically to utilize available surpluses of cotton. These activities, however, may have had long-time economic influences by creating consumer preference for articles made of cotton. To the degree that the programs are instrumental in influencing recipients when their incomes later permit to buy articles of cotton rather than competitive products, an enlarged demand for cotton will extend beyond the period of the program. Such increases in consumer demand, together with increases resulting from new-uses activities, serve to benefit growers by providing outlets for additional quantities of cotton.

OTHER GOVERNMENT ACTIVITIES RELATING TO COTTON SURPLUS DISPOSAL

GOVERNMENT RESEARCH RELATING TO NEW AND EXTENDED USES OF COTTON

Closely related to the action programs described above are the economic, biological, chemical, physical, and other types of research designed to develop new and extended uses for cotton; in fact, the action programs were mostly based on the information obtained through the research programs. The cotton utilization research of the Department of Agriculture includes research in such categories as (1) the chemical and physical properties of cotton fiber, (2) the alteration of fiber properties and the effect of changes on finished cotton products, (3) the modification of the properties of manufactured cotton products by various constructions and by finishing treatments, (4) the design, finish, and specifications for knitted wear and woven fabrics for use in homes, and (5) the economic analyses of the significance and possible effects of various types of new or extended uses for cotton.

Most of these studies are related to the production of cotton products that will have more desirable characteristics than those already available. For example, the characteristics of manufactured products depend fundamentally on the fine structure of cellulose in the cotton fibers. To produce stronger or more lasting products, it is necessary to understand the effects of light, heat, and chemical agents on the degradation of the cotton fiber and on the process of commercial cotton bleaching. To develop an improved cotton product, such as a better tire cord, it is necessary to study the effect of high temperature on cotton products, the mercerization characteristics of cotton of different varieties, and the effect of chemical modification or impregnation on the properties of cotton products.

As a result of such investigations, a number of new products have been developed. A new and improved machine for slashing

cotton textile warps, and a machine for opening, cleaning, and blending cotton for textile processes are now being fabricated.

Among the investigations regarding the modification of properties of manufactured cotton products by various constructions and by physical and chemical treatments are studies on the preservation of cotton fabrics against decomposition caused by weather, sea water, and micro-organisms; methods of improving flameproof, fireproof, and waterproof properties of cotton fabrics; and special finishes to improve the strength and durability of cotton products. The effects of swelling and stretching treatments on the properties of tire cords are being evaluated and the elastic properties of cotton tire cord are being studied. The development of heat-resistant tire cord from mercerized yarns is under way.

Through these investigations, methods for determining the resistance of treated cotton fabrics to weather and micro-organisms have been devised. Experimentally, a fireproofing method has been developed for light-weight cotton fabrics which will withstand a dozen laundry trials.

Other investigations include the improvement of the adhesion of cotton tire cord to rubber and synthetic rubber, and the relationship of cotton tire properties and the construction of the cord to its "flex life" and tensile strength. An improved tensioning apparatus for the manufacture of cotton cord has been developed. Electronic, high frequency heating has been used for improved and rapid drying of cotton yarns and fabrics.

Effects of these treatments on the properties of tire cord and other cotton products are now being evaluated as part of an appraisal of cotton compared with other products for tire cord. Field tests of tires (as yet few in number), as well as laboratory tests, have shown that the special cotton tire cords developed from these investigations consistently and materially outperform commercial cotton tire cords.

Investigations are being conducted in the research laboratories of the Bureau of Human Nutrition and Home Economics to determine the designs and finishes for knitwear, especially women's cotton hose, for superior appearance, fit, and quality. Home economists have also cooperated with other agencies in formulating specifications for certain cotton fabrics. Other work with cotton products includes the making of designs for aprons, dresses, and children's garments that combine attractiveness with high functional utility.

Economic analyses which have been and are being made of the various methods of disposing of surplus cotton are designed to provide the basis for selecting the types of action and research programs to be put into effect, for making revisions in existing programs, and for determining which programs and uses should receive the most emphasis.

SURVEYS AND REPORTS ON EXISTING USES OF COTTON AND ITS PRODUCTS

In the absence of such information and in order to ascertain the relative importance of the various individual uses, the Department has conducted several surveys and made reports on the

quantity of cotton used in the production of several types of cotton products. These have included estimates of the quantity of cotton used in various types of bags, in tire fabrics, and in cotton fabrics used for other purposes. The material assembled in connection with the surveys and reports has been used as a basis from which to estimate the quantity of cotton going into household, clothing, and industrial uses and has provided needed information relative to the major factors determining the quantity and quality of cotton used in producing certain of these products. Such information provides the basis for helping to determine what uses seem to offer the greatest opportunities and so gives assistance in planning the research and action programs designed to maintain and extend the uses of cotton.

OTHER GOVERNMENT EFFORTS TO STIMULATE INCREASED CONSUMPTION OF COTTON

The Department of Agriculture provides technical assistance and advice to commercial concerns that are interested in developing new outlets for cotton, or in maintaining existing outlets, or in extending existing outlets.

☆ U. S. GOVERNMENT PRINTING OFFICE: 1945—656270

For sale by the Supt. of Documents, U. S. Government Printing Office, Washington 25, D. C.

